Perspective Plan For Bengaluru Mumbai Economic Corridor (BMEC) Region

Final Report

vol. I

DMICDC

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CRISIL INFRASTRUCTURE ADVISORY

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Perspective Plan for Bengaluru- Mumbai Economic Corridor Region (Final Report)

Executive Summary

1. Introduction

1.1 Background

The urbanization trends in India are a direct reflection of the structural changes that are taking place in the economy.The combined contribution of industry and services to GDP is significantly higher compared to primary sector. However, it has been a cause for concern that while India has grown impressively in the last 15 years the main contribution to growth has come from the services sector rather than from the manufacturing sector, unlike the trend in most developing and emerging economies&growth in India has not been accompanied by a proportional supply of employment. Hence, Government of India's National Manufacturing Policy, thereby focuses on enhancing the share of manufacturing in GDP, from 15-16% since 1980, to 25% within a decade and creating 220 million jobs by 2025.

Simultaneously, The Department of Industrial Policy and Promotion (DIPP) of the Ministry of Commerce and Industry (MoCI), has initiated ambitious projects and proposals for enhancement of productive capacities of specific territories by creating investment regions and industrial nodes. These industrial nodes are planned to be located along key corridors which are the backbone of goods / material movement in the country. Planning these corridors in a participatory manner is critical to integrate economic, spatial, social, institutional and environmental strategies. This helps in optimal allocation of resources in a region as well as across the population to ensure sustainable development.

1.2 DMIC and PRIDe

Delhi – Mumbai Corridor is one such Industrial Corridor initiative by DIPP, aimed to promote Industrial infrastructure integrated with planned urbanisation & infrastructure development. DMIC, covering the states of Uttar Pradesh, National Capital Region of Delhi, Haryana, Rajasthan, Gujarat and Maharashtra is seen as a major industrial infrastructure initiative for the Northern & Western part of the Country connecting NCR (National Capital) to Mumbai (Financial Capital).

On similar lines DIPP, MoIC intended to promote Peninsular Region Industrial Development Corridor (PRIDe Corridor) to promote industrialisation in the central & southern parts of India by connecting Chennai &Bengaluru region to Mumbai, hence providing a potentially strong transport and industrial activity among the states of Tamil Nadu, Andhra Pradesh, Karnataka and Maharashtra. A number of initiatives were carried out by the Central & respective State governments to plan & promote PRIDe Corridor development. However, with the support of Central government, a proposal to promote Mumbai- Bengaluru part of the PRIDe as an economic corridor was discussed withUnited Kingdom (UK) government & during the visit of UK Prime Minister in February 2013 & November 2013, it was decided to carry out a Perspective Plan for the same. A similar initiative is being carried out for Bengaluru- Chennai part of PRIDe with the support of JICA.

1.3 Bengaluru Mumbai Economic Corridor (BMEC) and its Objectives

As mentioned above, the Government of India (GoI) in partnership with Government of United Kingdom intends todevelop the **Bengaluru Mumbai Economic Corridor (BMEC**) between Bengaluru and Mumbai in similar lines of DMIC. BMEC would have an influence area **spread across the states of Karnataka and Maharashtra, covering an overall length of 1,000 km approx.** The BMEC Corridor alignment covers several existing urban nodes. These include, in Maharashtra, the Mumbai Metropolitan Region, Pune, Satara, Sangli & Kolhapur and covers Belagavi, Hubballi-Dharwad, Haveri, Davanagere, Chitradurga, Tumakuru and the Bengaluru Metropolitan Region in Karnataka.

The Perspective Plan for the BMEC Region will dovetail the initiatives of the respective State Governments in establishing its Vision and Objectives for industrial development. With human development indices for the two states being higher than national averages and above most other states in India, the BMEC promises advanced levels of economic development harnessing refined skill-sets that cater to manufacturing.

The prime objective of BMEC is to promote a sustainable investment climate to promote economic development along the corridor by establishing world class infrastructure facilities, planned industrial development & sustainable urbanisation. Bengaluru Mumbai Economic Corridor is thus intended to facilitate development of a well- planned and resource-efficient industrial base served by world-class sustainable connectivity infrastructure, bringing significant benefits **in terms of innovation, manufacturing, job creation and resource security to the two states.**

Based on its successful initiatives in DMIC, Delhi-Mumbai Industrial Corridor Development Corporation Limited (DMICDC) on behalf of Department of Industrial Policy and Promotion (DIPP), GoI, will act as the nodal agency in developing the BMEC Corridor. DMICDC initiated the process by inviting international competitive bids to provide consultancy services of preparing Perspective Plan for the BMEC. A consortium led by Egis India Pvt. Ltd in partnership with IAU of France & CRISIL Infrastructure Solutions, India was appointed as the consultant by DMICDC through the above-mentioned process.

1.3.1 Objective of the Perspective Plan Preparation

DMICDC has identified the following as the prime objectives for preparing the Perspective Plan for BMEC:

- To assess the **feasibility of establishing the BMEC**;
- To prepare a **Regional Perspective Plan for the Bengaluru Mumbai Economic Corridor Region**, along with developing a **strategy for transforming the region into a globally competitive manufacturing and investment destination** through sustainable development;
- To **identify suitable nodes to be taken up for industrial development** within the project influence area
- To analyze the **benefits of development of BMEC,** including impact on regional growth, employment, industrial output, exports and human capital.

The focus of preparing the Perspective Plan for the region would revolve around the above-mentioned objectives and the Final Perspective plan presented in this report also adhere the same.

1.3.2 Scope of Work of Consultancy

Preparing strategic framework to create a vibrant economic corridor will be the prime component of the scope of work of the assignment. The Perspective Plan targets a horizon period of twenty five years and the following were listed as the major components of the SoW to be achieved in this assignment:

1. Delineation of the Corridor and its influence area
2. Macro level development vision, targets & Strategies
3. Identify & Strategize appropriate industrial development to attract international investments in manufacturing
4. Identification location of potential Nodes/ Mega Cities
5. Recommendations for development & upgradation of the regional Infrastructure linkages
6. Developing a Green Vision for BMEC Region

Components covered in Final Perspective Plan

7. Preparation of Broad Concept Plan (Site Specific Plan) for a Industrial Node/ Greenfield Megacity
8. Phasing strategy and defining roles of various stakeholders

Current Stages

1.3.3 Inception Report

The project Inception Report was submitted & presented in the month of April 2014. The Inception report components, first situates the BMEC Region within the context of the national manufacturing and economic development scenario, following which the plausible global positioning of the region has been established through a set of relevant benchmarks. Further, the inception report carries out a preliminary profiling of the Corridor states to understand the existing administrative, economic, demographic & infrastructure status. Based on which a preliminary delineation of the corridor region was also carried out as part of the Inception stage. The key challenges in achieving the objective of the perspective plans were also highlighted as part of this report. An ambitious Vision for the Development of the BMEC Region has been fore-grounded in this report, thereby providing foundation to the approach and innovations in methodology elaborated upon. Further, the inception also provides a proposal to manage the Spatial Data Base, which would be generated as part of the plan preparation.

1.3.4 Perspective Plan for BMEC region - Draft Report

Subsequent to the Inception Report, the preparation of the Perspective Plan of BMEC region was initiated and an Interim version of the Perspective Plan' Draft Reportwas submitted on 29th September, 2014. The Perspective Plan - Interim Draft was reviewed by DMICDC & DIPP on 20thOctober, 2014, subsequently reviewed by KSIIDC, DI&C, GoK on 28th& 29th October, by Department of Industries & MIDC, GoM on 12th November 2014. Subsequently, as per the inputs received from DIPP, DMICDC, and both the State Governments and as per the data made available till 14th November, 2014, the interim Draft report was updated and the final version of BMEC Perspective Plan – Draft report was prepared and submitted on29th November 2014. This version was further updated based on information provided by Office of Settlement Commissioner & MRSAC, GoM, on 2nd December 2014 & 23rd December 2014 respectively, and an updated final version of the Perspective Plan – Draft report was submitted in April 2015.

The Perspective Plan's Draft Report, primarily focuses on Delineations of the Corridor Influence Region, followed by **Market Assessment towards promoting Industrialisation in the region**. Based on the outcome of market assessment, **potential industrial sectors were identified** for the delineated corridor region. The vision & goals conceived as part of the inception stage were consolidated as per the outcome of market assessment, and based on the which the **various benefits to region like economic growth , potential investments, export potential & employment generation** were estimated. These estimations facilitates in arriving at the **population estimates of BMEC region and also the industrial land requirements.** Another **major & crucial component of the draftreport was the detailed assessment of the delineated corridor region to identify suitable areas to locate the potential industrial nodes/ mega cities.** Around ten locations were identified across the region to locate industrial nodes, were identified as part of the Draft Plan. The location suitability assessment also facilitated in identifying appropriate **locations to accommodate the projected additional population of the region through Greenfield & Brownfield cities. Draft Infrastructure perspectives comprising of Transport Infrastructure components like, Road, Rail, Ports &Airport**, and Industrial Infrastructure components like **Water & Power were also presented in the Draft Plan.** The Draft Perspective Plan preparation process also involved interactions with various Stake holders of Central, various departments of respective State Governments and also with some of the existing & potential industrialist/ investors. KSIIDC & MIDC which were appointed as the project Nodal agencies and Departments of Industries & Commerce/ Department of Industries of the respective State Governments of Karnataka & Maharashtra also facilitated in the process of preparing this Draft perspective plan providing vital inputs towards the same.

1.3.5 Perspective Plan for BMEC region - Final Report

The draft version of the Perspective Plan has identified 10 potential districts to locate the Industrial Node cum Mega cities across BMEC region. These industrial nodes cum megacities are envisioned to act as the primary economic growthcentres and are expected to propel theinduced growth scenario of the region. Strategizing the process to facilitate development of these industrial nodes is the primary focus of this final version of Perspective Plan report. **Identification of appropriate locations for Node development within these ten districts, facilitating the Government in the process of identifying priority nodes for developments, identifying appropriate site locations of the identified priority node locations, estimating the infrastructure requirements of the nodes, identifying priority infrastructure projects which are expected to promote node development, phasing of node development and investment requirement for development of nodes** form part the above-

mentioned strategies and the same is covered in this final version report. The above-mentioned process was carried based on inputs provided by respective State Governments on the Draft Perspective Plan and through continuous process of interaction with various Stakeholders and joint filed visits.

This final version also covers **implementation phasing and investment requirements of all major projects under each of the infrastructure heads, across the region structured as per the phasing of node development** and the same is presented as a **comprehensive list of project under each of the States under three main implementation phases of Short, Medium & Long term**. The investment requirements are also categorised under the above-mentioned three implementation phases, and the investment requirements are under each sector and under each of the States, which facilitate the investment planning of BMEC's implementation.

The final report has also carried out updations of the infrastructure perspective components presented in the draft plan report. As mentioned above, these updations were carried out based on inputs provided by various stakeholders on the draft plan and also based on discussions held with various infrastructure ministries on the priority list of projects identified under BMEC.

The report also emphasises the need for **preparation ofSub-Regional Plans for all BMEC districts,** which is required to structure the development of BMEC's sub regions and components other than the Node development. This chapter also provides an outline on the components of Sub-regional plan.Strategies to facilitate successful industrial promotion in the region & Strategies towards Land Management were also covered as part of this report.

The following are the list of major components covered as part of this final version of BMEC Perspective Plan report and order of this listing also indicates the overall structure of this report:

- **BMEC Corridor Vision, Goals & Targets**
- **Regional Profiling of the Corridor States**
- **Assessment of Economic & Industrial Profile of the Corridor States**
- **Delineation of the Corridor Influence Region**
- **Detailed profiling of the Corridor Core Districts**
- **Market Assessment to identify feasible & target Industrial sectors for BMEC region**
- **Estimation of Economic & Industrial Growth potentials and benefits of the Region**
- **Population estimation of the Corridor Region & the need for Greenfield & Brownfield cities**
- **Suitability Assessment for locating potential Industrial Nodes & Megacities in BMEC**
- **Demand Gap Assessment on availability of land within the corridor region**
- **Industrial Development Strategies towards creating enduring environment for accelerated growth in the region**
- **Transport Perspective of the region covering, Road, Rail, Port & Port Connectivity and Airports**
- **Infrastructure Perspective covering Power, Water& Housing**
- **Finalisation and prioritization of suitable locations for development of Industrial Nodes / Mega cities in BMEC region**
- **Identified Site Locations of Priority Nodes of BMEC**
- **Identification of Early Bird& Priority Projects of Priority Nodes**

- **Implementation Phasing & preliminary cost estimation of Node development**
- **Implementation & Investment Phasing of BMEC region**
- **Land Management Strategies**
- **Marketing Strategy**
- **Need for Sub-Regional Plans as part of BMEC's implementation Strategy**

This final report was prepared as per the three priority nodes (Dharwad, Belagavi & Chitradurga-Davangere) finalised by Government of Karnataka for Karnataka Region of BMEC and the one priority node (Satara Node) as intimated by Government of Maharashtra to explore as the priority node for Maharashtra region of BMEC, during its meeting on 29th July 2015 and also as per the report on recommendation on finalisation of node locations, submitted by the consulatnst on 1st September 2015.

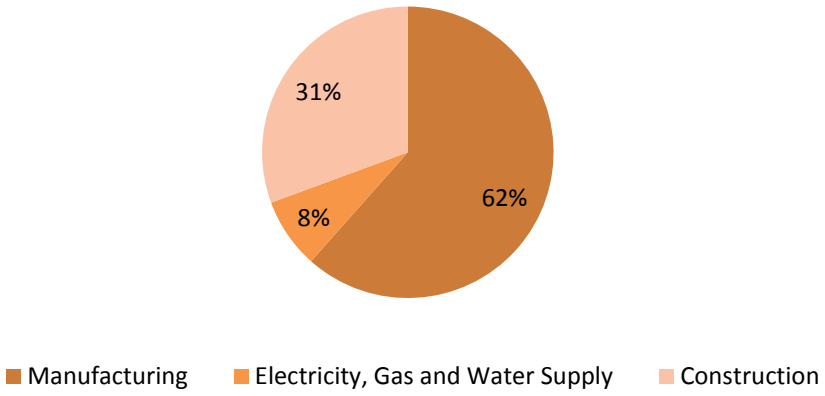
2. Indian Economic Scenario

2.1 Macroeconomic Overview

Over last two decades India has become one of the fastest growing economies with the implementation of economic reforms. Today, the Indian economy is categorized by a liberalized foreign investment and trade policy which plays a significant role in attracting private sector investments. India has grown to become a trillion dollar economy with a largely self-sufficient agriculture sector, diversified industrial base, and sound financial and services sector. The GDP value of India represents 2.97% of the world economy. The GDP of India was registered at INR 5,741,791 crores at constant prices in 2013-14.The primary, secondary and tertiary sectors in the year 2013-14 (PE) contributed 16%, 24% and 60% to the Indian GDP respectively.

The manufacturing sector contributed 62% to the secondary sector GDP of the country in 2013-14 with the construction sector contributing 31% and electricity, gas and water supply contributing 8% respectively.

Figure: Composition of GDP for secondary sector (2013-14)



Total secondary sector contribution: INR 13,93,387 crores
Source: CRISIL Research, CSO

2.2 Export Import scenario

Overall, Indian exports are valued at INR 18,94,182 crores while imports are valued at INR 27,14,182 crores in 2013-14 (P). Manufactured goods account for approximately 64% of India's export performance in 2013-14 followed by approximately 16% contribution by primary products. The growth of exports slowed down to 11% in 2012-13 from 28% in 2011-12 on account of deceleration in the growth of unit value of exports. This deceleration was due to decline in unit value growth of exports of chemicals and related products and other items including mineral fuels, lubricants and related materials, and miscellaneous manufactured articles.

Table: Total Trade of Exports and Imports over the years (INR crores)

Year	Exports	y-o-y change	Imports	y-o-y change	Total Trade	y-o-y change	Trade Balance
2007-08	6,55,864	15%	10,12,312	20%	16,68,176	18%	(3,56,448)
2008-09	8,40,755	28%	13,74,436	36%	22,15,191	33%	(5,33,680)
2009-10	8,45,534	1%	13,63,736	(1%)	22,09,270	0%	(5,18,202)
2010-11	11,42,922	35%	16,83,467	23%	28,26,389	28%	(5,40,545)
2011-12	14,65,959	28%	23,45,463	39%	38,11,422	35%	(8,79,504)
2012-13	16,34,319	11%	26,69,162	14%	43,03,481	13%	(10,34,843)
2013-14 (P)	18,94,182	16%	27,14,182	2%	46,08,364	7%	(8,20,000)

P: Provisional

Source: Economic Survey of India 2013-14

Fuels constitute a major component of India's import performance in 2013-14 with 40% share followed by capital goods contributing 12% share. Imports decelerated by 14% in 2012-13 as compared to 39% in the previous year on account of slowing down of unit value of imports by 66% in 2012-13. This deceleration in unit value of imports was due to deceleration of unit value of most products except beverages and tobacco and certain miscellaneous items.

2.3 Employment

As per the National Sample Survey Office (NSSO) data, number of persons employed in workforce increased from 398 million in 1999-2000 to 473 million in 2011-12 growing at a CAGR of 1.4%. This slowdown in employment numbers has been a cause of concern for the policy makers. Overall agriculture sector has witnessed a decline in employment of 0.3% while industry and services has accounted for 4.9% and 2.5% employment increase respectively.

Table: Trends in employment (in million)

Sector	1999-2000	2004-05	2011-12	CAGR growth
Agriculture & allied	238	268	231	(0.3%)
Industry	65	83	115	4.9%
Services	94	107	127	2.5%
Total employment	398	458	473	1.4%

Source: Economic Survey of India 2013-14

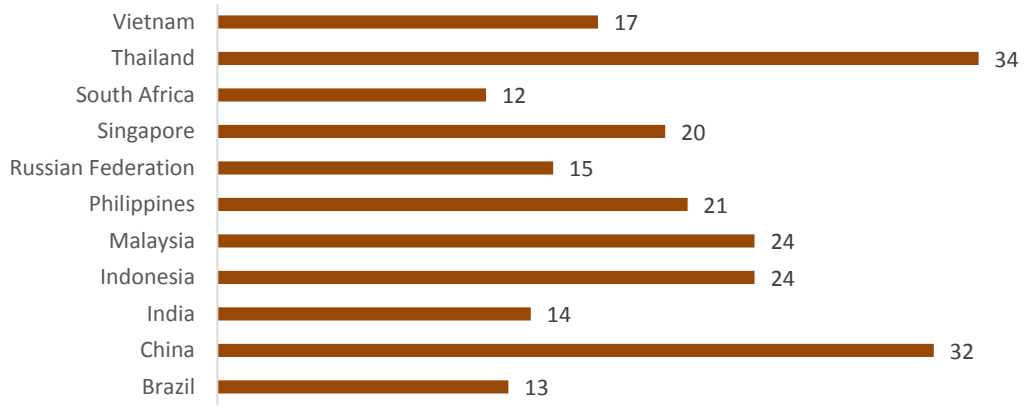
In 2011-12, agriculture and allied sectors still employed majority of the workforce i.e. 49% of the total workforce (231 million) showing high dependence of the country on the primary sector. Industry and services sectors contributed approximately 24% (115 million) and 27% (127 million) respectively to the total workforce in the same year. Within the industry sector, more than 80% of the employment increase between 2004-05 and 2011-12 was on account of the booming construction sector while the manufacturing sector employment increased by 6 million during the same period. Employment in services sector increased by 20 million during the same period with the increase more or less evenly distributed.

2.4 Comparative position of India in the world

India, part of BRICS nations i.e. Brazil, Russia, India, China and South Africa also shares important trade relationships with ASEAN countries. BRICS and ASEAN nations together contribute 32% to the world GDP on purchasing power parity basis with China and India leading with 15% and 6% contribution respectively.

Among the BRICS countries, China has the highest manufacturing sector contribution of 32% to the country's GDP with the country emerging as a leading exporter of merchandize in the world. India has the lowest manufacturing sector contribution of 14% to country GDP as per World Bank data. Among the ASEAN countries, Thailand and Malaysia have manufacturing sector contributing more than 20% to the respective country GDPs.

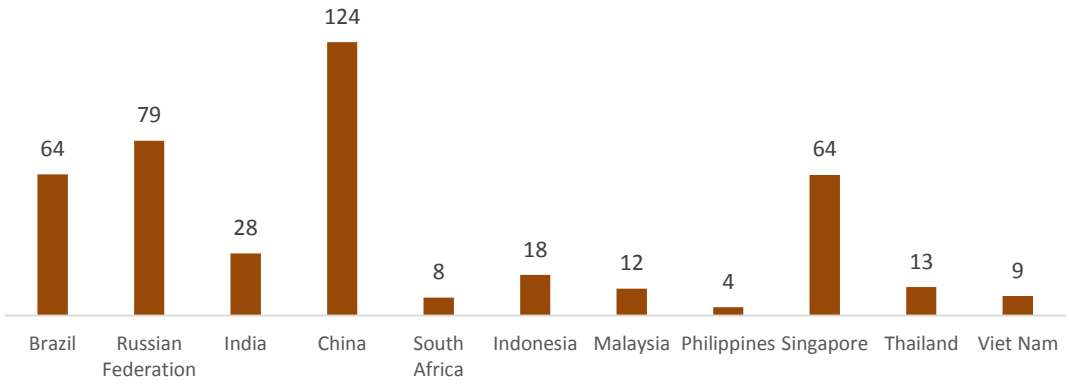
Figure: Country wise manufacturing sector contribution to GDP (in %) (2012)



Source: World Bank

It is also important to understand the foreign investment flows in competing countries. According to UNCTAD's World Investment Report 2014, India is the fourth-most attractive destination for foreign direct investment (FDI) after China, the US and Indonesia in the world. Indian markets have significant potential and offer prospects of high profitability and favourable regulatory regime for investors. Also, India ranks below China, Russia, Brazil, Singapore and Indonesia in terms of FDI inflows received in 2013 (US$ 28 billion) among BRICS and ASEAN countries.

Figure: FDI inflows in 2013 (US$ billion)



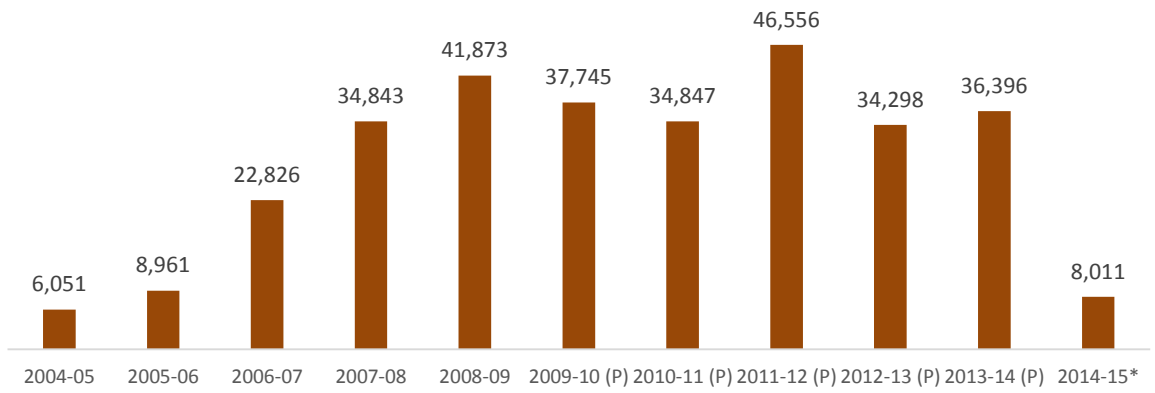
Source: UNCTAD World Investment Report 2014

As per the World Bank Doing Business Report 2014, India has the lowest rank among the BRICS countries (134th) in terms of ease of doing business while in terms of comparison with ASEAN countries, Laos, Cambodia and Vietnam fall below India in terms of rankings. India scores poorly in this regard due to its poor infrastructure, multiple clearances and quality of governance. While on an average in the world, it takes 7 procedures and 25 days to start a business, in India it takes 12 procedures and 27 days to start a business. Also, as per the Global Competitiveness Index of the World Economic Forum 2013-14, India ranks overall 60th in the list with Russia being the only BRICS nation behind India in the list. India has been overtaken by several countries including Brazil and South Africa since 2009 due to inadequate infrastructure which remains a strong hindrance for industrial growth. The country also faces issues related to corruption and bureaucracy which are strong deterrents towards reforms and business friendly policies.

2.5 India's FDI policy

India's economy has strong fundamentals and is host to several eminent global corporate giants that are leaders in their respective fields. India's FDI policy has been gradually liberalised to make the market more investor friendly. India has received cumulative FDI worth US$331,924 million between April 2000 and May 2014 with highest equity inflows in the services sector. Construction development including townships, housing, built-up, infrastructure etc. has received the second largest equity inflows of 11%.Mauritius has been the largest source of FDI inflows in the country for many years. Since April 2000, cumulative FDI inflows from Mauritius reached US$ 80.8 billion in May 2014.

Figure: FDI inflow in India (US$ million)



*Source: DIPP; * till May 2014; P: Provisional*

2.6 Going ahead key positives and concerns

The overall Indian economy is likely to witness upswing with expected reforms to achieve sustained growth. This growth is based on the expectations of modest revival in the global economy, improved balance of payments situation and manufacturing sector performance, which registered a growth of only 0.2% per annum in the last two years. The Union Budget 2014-15 has announced steps to raise private consumption growth as well as push growth in the manufacturing and construction/infrastructure sectors. The Economic Survey of India 2013-14 (July 2014) has forecasted a growth rate of GDP at constant prices in the range of 5.4 – 5.9% in 2014-15 for the economy. This takes into account the revival of growth in the industrial sector witnessed in April

2014 to continue for the rest of the year, the generally benign outlook on oil prices and the absence of pronounced destabilizing shocks.

Therefore, in order the boost the overall economic growth, it is essential to revive the manufacturing sector through revival of private investments. It is imperative to build conducive policy environment, devising special incentives for SEZs and NIMZs. Government also needs to strengthen its focus on establishment of industrial clusters and removing infrastructural bottlenecks which is one of the major issues raised by industry for manufacturing downturn.

2.7 Major National level Infrastructure Developments

Several core infrastructure projects have been taken up in India of port, highways, airports, power as well as industrial infrastructure. These projects are being developed with public funds as well as with private sector participation. This infrastructure investment will further support the industrial and overall economic development in the country. The new large industrial infrastructure projects including DFC, DMIC, CBIC, BMEC etc. NIMZ, SIR and IR are being developed. Regulatory support is being provided by developing acts like developing acts like SIR Act of Gujarat and National Manufacturing Policy for NIMZ etc. This part of the report observes some of the major highlights of these initiatives which acts and would act as impetus to economic growth and industrialisation.

- **Ports:** According to industry estimates, ports account for nearly 70% by value and 90% by volume of the country's international trade. The port sector in the country consists of 13 major ports and around 200 non-major ports, of which only 60 handle traffic. India's PPP initiative in Ports sector has contributed largely to meet the growing demand do the Ports sector. By end of 11th 5 year plan (2012), Private Sector Investment was around 41,261 Crores which is 83% of the total investments in the sector and is expected to reach 138910 Crores (86.5% of total investments) by end of 12th plan.

- **Airport:** India has 449 airports and airstrips. Domestic traffic handled in India grew at a CAGR of 13% between FY06-FY13 to reach 115 million passengers. Presently India has four PPP airports (Mumbai, Delhi, Hyderabad and Bengaluru) and one PPI airport (Cochin); together these airports handle over 60% of country's traffic.It is estimated that domestic passengers will be 209 million and international passenger will be 60 million by FY17. Domestic and international cargo is expected to reach 1.7MMTPA and 2.7MMTPA by FY17.Ministry of Civil Aviation plans to construct 17 new airports during 12th five year plan & also plan to set up 51 low cost airports to improve connectivity of Tier II and Tier-III cities. 71,000 crores is the investment excepted in this sector by end of 12th Plan with Private sector contributing up to 56,500 crores.

- **Highways:** As of FY13, 40% of total traffic in India is carried by 79,116 km of national highways while remaining 60% is carried by 155,716 km of state highways and 4,455,010 km of other roads.11th plan saw 5,16,180 Crs of investment in roads sector & its is estimated that 9,20,021 Crs would be the investment during the 12th plan with Private sector contributing around 32% of investments .

- **Railways:** Indian Railways is one of the largest rail networks in the world with 64,600 kilometres (km) connecting around 7,146 stations. The passenger traffic grew at a CAGR of 5.7% over the

period of FY07-FY12 to reach 8.2 billion passengers.Freight traffic grew at a CAGR of 5.5% between FY07-FY12 to reach 975 million tonnes and revenue contribution increased by 10.5% during the same period. Railways plans to award PPP projects to locomotives and coach manufacturing units and the construction of a corridor for high-speed rail. Ministry of Railways has given in-principle approval for rail connectivity projects to ports of Jaigarh and Rewas (Maharashtra).PPP investment was also expected inlogistics parks, PFT, DFC S, and freight schemes in 12th five year plan. 12th plans estimates are around 4,56,743 crores with around 17.5% expected from private investments.

- **Power:**India is the fourth largest energy producer in the world with an installed capacity of 234 GW (as of December 2013). Energy generation in the country is dominated by thermal energy accounting for 68% of total installed capacity followed by hydro generation (17%), renewable energy sources (12%) and nuclear power generation (2%).Power demand is dominated by industrial segment which accounts for 45% of the demand followed by domestic (26%), agricultural (22%) and commercial (7%) respectively.The total installed capacity from the private sector has increased to 31% of the total installed capacity as of March 2013 as compared to 27% as on March 2012 and 21% as of March 2011. Private sector is expected to account for 47% of investments in electricity segment and 90% on non-conventional energy segment for 12th plan which has estimated a total investment of 14,99,914 Crs & 2,47,408 Crs for Electricity & Non Conventional Energy sectors respectively.

- **This section also highlights the major initiatives of the government to promote Industrial infrastructure of the country and discusses DFC, DMIC and the Highlights of National Manufacturing Policy.**

- **It also highlights government initiatives to develop National Investment and Manufacturing Zones (NIMZs)** which will be developed in the nature of Greenfield industrial townships, benchmarked with the best manufacturing hubs in the world with a minimum land area of 5,000 hectares (50 sqkm) for each of the NIMZ. It also provides the list of NIMZs which are granted in-principle approval for development **including 2 in Maharashtra, 1 in Karnataka** with 2 more under assessment for approval & 3 in AP which are located in and around the proposed BMEC region

2.8 Thrust to manufacturing sector

2.8.1 National Manufacturing Policy (NMP)

Over last two decades India has become one of the fastest growing economies with the implementation of economic reforms. The GDP value of India represents 2.97% of the world economy at INR 5,741,791 crores (constant prices) in 2013-14 (P). The manufacturing sector performance in India has stagnated at 16% of the GDP and overall India's contribution in world manufacturing is meagre 1.8% in last few years. This trend which is in strong dissonance to other economies including China where manufacturing sector contributes 34% to national GDP.The manufacturing sector which has not been the area of contention in the past has been outgrown by services sector. Services sector today has become an important contributor in India's economy and it contributes 60% to GDP.

Going forward, Indian economy is expected to witness upswing with expected reforms to achieve sustained growth. This growth is based on the expectations of modest revival in the global economy, improved balance of payments situation and manufacturing sector performance. National Manufacturing Policy (NMP) has also been initiated by the government which aims to enhance the manufacturing sector contribution to 25% of GDP by 2022 and creation of 100 million jobs.

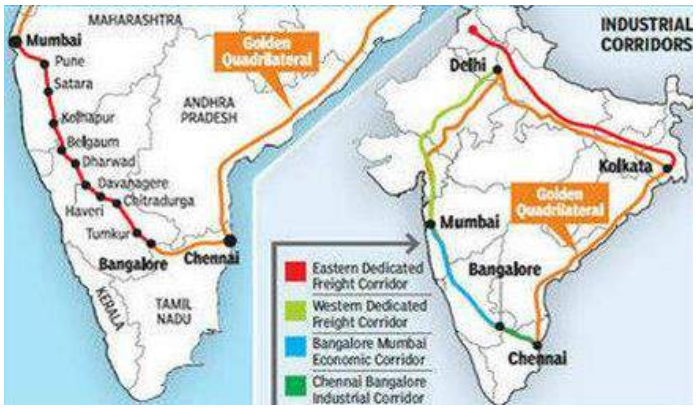
Objectives of National Manufacturing Policy

- Increase manufacturing sector growth to 12-14% over the medium term
- Create 100 million additional jobs by 2022
- Focus on inclusive growth by creating appropriate skill sets among rural migrant and urban poor
- Increase domestic value addition and technological depth' in manufacturing
- Enhance global competitiveness of manufacturing through appropriate policy support
- Ensure growth sustainability with a focus on environment

National Investment and Manufacturing Zones (NIMZs) are also being developed to create industrial townships to enable creation of world class industrial hubs. There are 16 NIMZs which are being taken up and these NIMZs are various stages of design and implementation. Therefore, with the government pushing India as manufacturing destination and prioritizing infrastructure developments as top priorities, overall investment climate is expected to improve in coming years reviving investor sentiments.

2.8.2 Industrial Corridors

Corridor development expected to stimulate growth in the region connecting two major cities in India



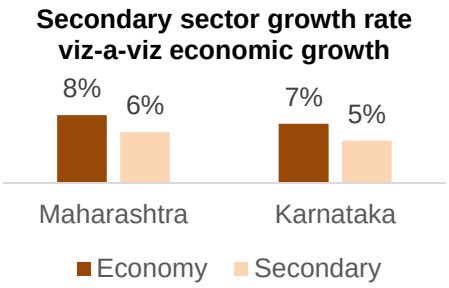
Government in order to stimulate investments in the manufacturing sector and transform India into a manufacturing hub is focusing on building industrial and economic corridors across the country. These corridors are expected to focus on improving manufacturing contribution across the states, address infrastructure gaps, clear regulatory bottlenecks in doing business while focusing on employment generation and enhanced value addition across the industries.

First industrial corridor project launched in India was the Delhi-Mumbai Industrial Corridor (DMIC) project was launched by the Union government in 2006. The corridor project runs across six states in the country including Uttar Pradesh, Haryana, Madhya Pradesh, Rajasthan, Gujarat and Maharashtra. Besides DMIC, government has also approved other corridor projects including Amritsar Kolkata Industrial Corridor, Chennai-Bengaluru Industrial Corridor, Bengaluru Mumbai Economic Corridor (BMEC) and Vizag-Chennai corridor.

These corridor projects are expected to transform the manufacturing sector landscape in the country in the next 20-25 years with infrastructure linkages which will benefit the industrialization and urbanization. Union budget 2014-15 also announced the establishment of National Industrial Corridor Authority (NICA), which will coordinate the developmental activities of corridors across the country.

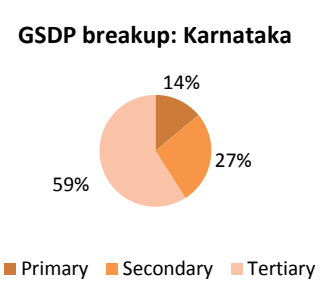
The Bengaluru Mumbai Economic Corridor (BMEC) will connect two urban and economic development centres of Mumbai and Bengaluru and have contiguous economic region encompassing few growth centres of industrial-urban development. The region which currently covers 7% of India's population accounts for 14% of India's secondary and tertiary sector GDP.

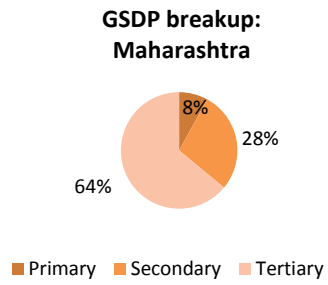
Maharashtra economy has grown at a CAGR of 8% between 2006-07 and 2012-13 while the secondary sector in the state has grown at a CAGR of 6% in the same period. Karnataka economy has grown at 7% between 2006-07 and 2012-13 while secondary sector has grown at 5% during the same period. Karnataka and Maharashtra are important states in the country from manufacturing context with Maharashtra ranked first, accounting for 17% of industrial output in the country and Karnataka ranked fourth accounting for 7% of industrial output as per Annual Survey of Industries 2011-12.

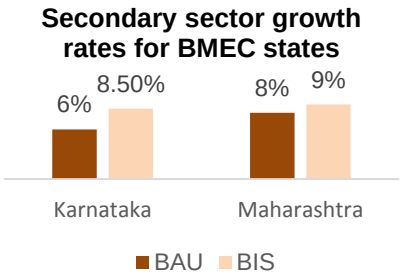


Source: Economic Survey of respective states

Tertiary sector plays a dominant role in both the states with the sector contributing more than 60% in both the states economies.







Source: Economic Survey of respective states, GSDP breakup of Karnataka for 2013-14 and Maharashtra for 2012-13

It is expected that secondary sector of Karnataka will grow at the rate of 8.5% between 2016-17 and 2040-41 as compared to business-as-usual scenario of 6% while the secondary sector in Maharashtrawill grow at 9% from business-as-usual scenario of 8%. It is expected that node development across the BMEC corridor is expected to result in incremental GDDP for districts/nodes due to additional stimulus to industries and expected infrastructure developments.

The region boasts of several important towns including Pune which has emerged as an automobile and industry hub; Bengaluru known as IT hub of India housing several global R&D majors; Hubballi-Dharwad having important auto establishments and Kolhapur, an important industrial town towards Maharashtra-Karnataka border. However, imbalance in development paradigm across these major districts will be leveraged in the corridor development with focus on infrastructure development for industrial growth of less developed districts.

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3. Bengaluru – Mumbai Economic Corridor (BMEC) Region: Vision, Goals and Targets

This section of inception report discusses the prime vision set for development of BMEC, the goals set to achieve the overall vision as well as certain sectoral vision or flagship projects which are envisioned to benchmark BMEC as a global destination are outlined here.

3.1 Vision and Goals

The economic vision for BMEC is to be viewed from the context of value-adding, sustainability, and inclusive aspects of development. Capital is a scarce resource in today's environment and there are multiple alternatives which chase this scarce resource. The vision of the corridor is to attract that class of investors who have a long term focus of development and invest based on these three pillars.

The current economic profile of both the states suggests that they are mature states with contribution of tertiary sector being more than 50%. Also in the area of human development, access to higher education is significant in comparison to the other states of India.

Another unique feature of both states is to attract significant amount of human capital from other states. The proposed economic activities should be able harness these resources and continue to act as a magnet.

The Perspective Plan for the BMEC Region thereby posits an ambitious Vision for Transition:

The BMEC Region as a Globally Competitive and Sustainable Region

3.1.1 Goals

Six overarching goals for industrial development in the BMEC region which would also facilitate in achieving the overall vision for BMEC are:

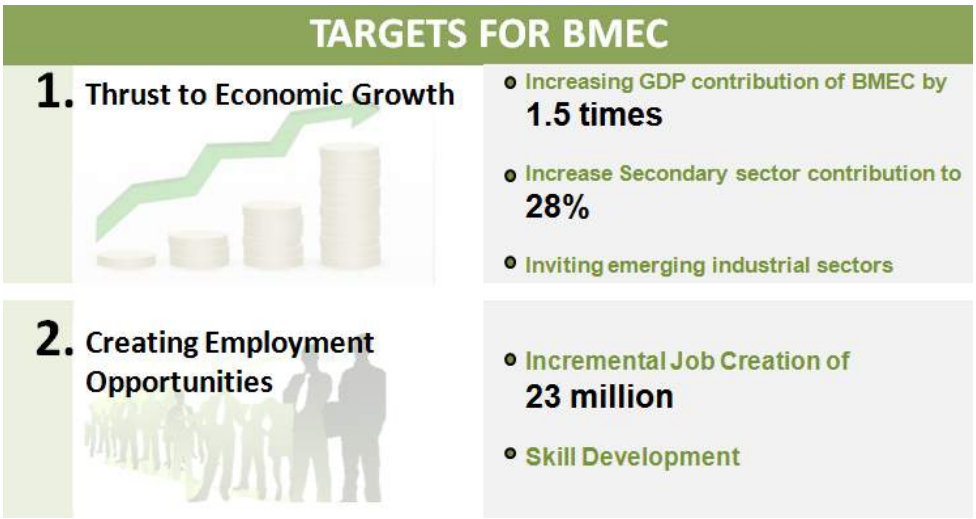
1. **Being Competitive in Manufacturing – The Imperative;**
2. **Applying Technological Progress to Manufacturing**
3. **Productive Infrastructure for Economic Gains**
4. **Pragmatic Environmental Regulations**
5. **Inclusive Growth**
6. **Systematic monitoring and benchmarking of Industrial Performance**

The BMEC Region as a Step Change

Given above the focus would be to create such "Areas of Excellence" which has the potential to draw these resources. Access to quality infrastructure is more a hygiene factor in this era of border less world. At a steady state the combined GDP of both states is expected to grow rapidly in the near future. The focus would be to fast track this and target specific sectoral areas of development. This will in turn create accelerated employment and increased investments along the corridor. The idea is to create a step change in the areas of economic growth, employment potential and investments to the individual states through the development of such a corridor.

3.2 Targets of BMEC region

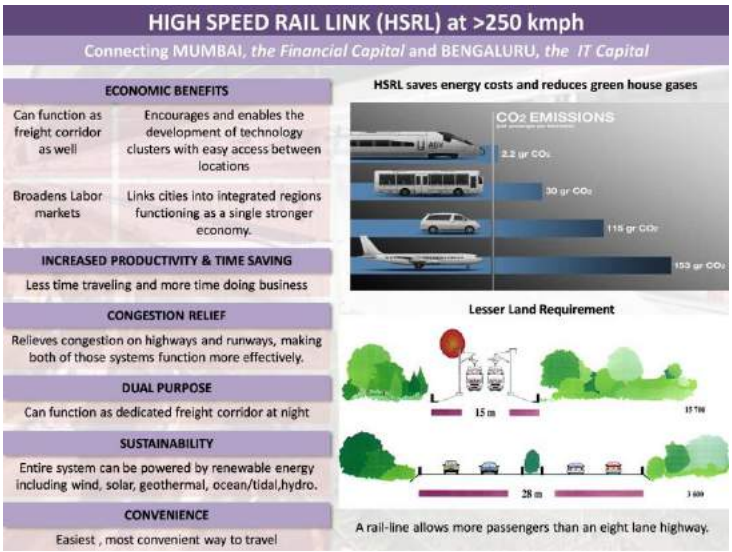
In order to achieve the overall vision of establishing BEMC as a "**Globally Competitive and Sustainable Region"**and to facilitate achieving the structured Goals & Vision, certain quantified Growth Targets were formulated and fixed. Quantified measures of **Economic Growth, Employment Generation, Exports and Investments** are identified as key Growth Targets which will facilitate in achieving the overall vision & goals of this region. These **growth targets are fixed to be achieved over a period of 25 years** (2017 -2041). The following illustration provides key targets formulated for BMEC region:



3.3 Envisioned flagship projects of BMEC region

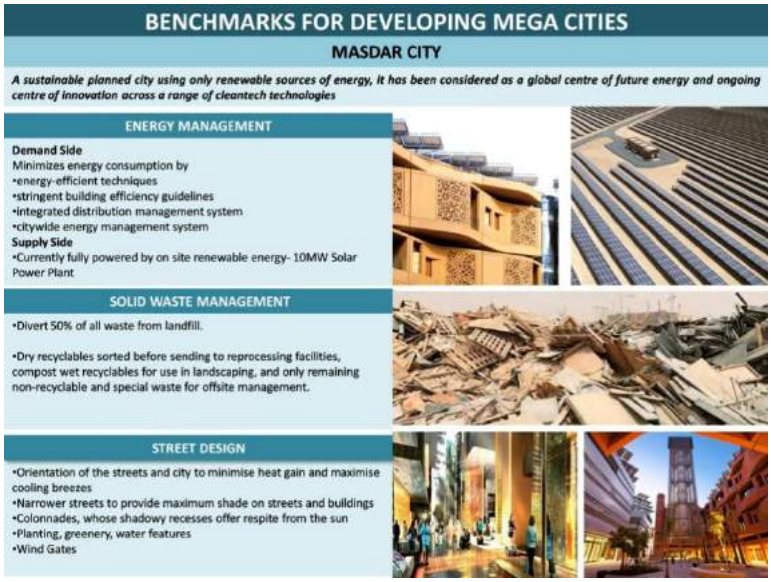
As part of the overall vision, the Inception also identifies certain Sector specific Vision or Flagship projects which are foreseen as key components in establishing BMEC corridor as a Unique, Competitive & Globally attractive destination. The following are some of the sectoral visions envisioned to be part of the BMEC.

1. **Bengaluru-Mumbai HSRL (BM-HSRL) as primary rail infrastructure of BMEC.** BM-HSRL is expected to bring the two cities which are currently 24 hrs away (in terms of mass transport) to less than 4 hours away and is considered to be a major component of BMEC. It is envisaged that HSRL would act as a dual transport infrastructure for both freight & mass passenger commuting (Trans-Siberian Railway of Russia is an example) .Studies indicate almost all developed countries have HSRL & this has remained as one of the major transport infrastructure among their industrial corridors (Tokyo-Nagoya-Osaka Corridor). All developing countries like China, Brazil, South Africa, Russia, Indonesia etc. already have HSRL and in fact with 10,000km of HSRL, China has the longest HSRL network in the world. Studies also indicate that HSRL is fuel efficient & emits lesser greenhouse gases when compared to all other modes of transport (76% less energy than air & 31% less energy less than conventional electric trains and emits only 1.4% of Carbon emission of Aircrafts).

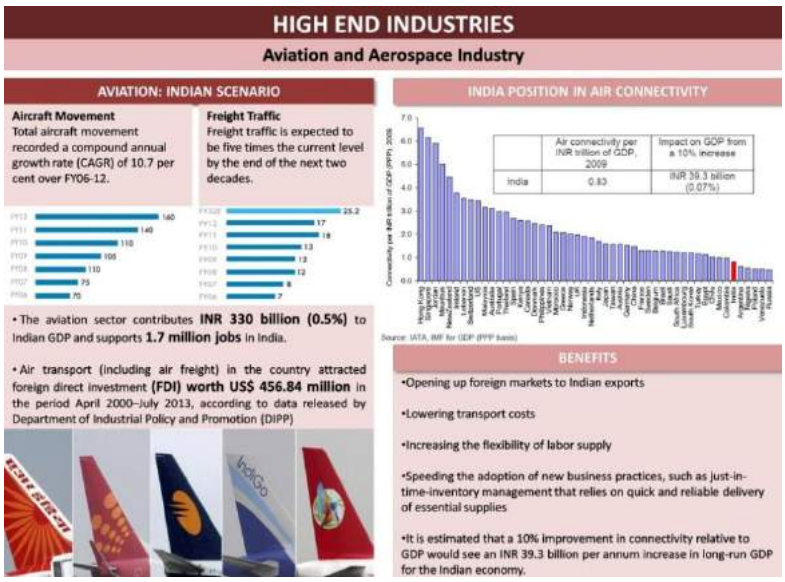


2. **Harvesting Non Conventional Energy would remain a primary Vision of Power Sector Infrastructure development:** Harvesting energy from Solar, Wind, Wave & Tidal energy would remain as one of the major vision of power sector. Countries like Germany consumes 25% of its energy demand through power generated from Renewable Energy resources. Wind energy already a key component of installed capacity, Solar is emerging and Wave is one area which yet to be explored in this region and the same would be explored as part of this study. The Perspective Plan would focus on a strategy to maximize the power share from these renewable sources.

3. **Development of Major Port Infrastructure/ Trans-shipment Terminals:** With BMEC to emerge as a 1000 km long Industrial destination, it has to be supported with an International Standard Port infrastructure along the Western Coast of Karnataka-Maharashtra and establishment of the same would remain as primary vision of Port Infrastructure Perspective plan. NMPT in the south & Mumbai & JNPT in the north are the Major Ports serving the region. With lack of proper port connectivity to NMPT, the Bengaluru/ Karnataka region depends on either Chennai / Ennore Port in the east or at Mormugao Ports at Goa. With number of ports being developed at Dighi & other parts of coastal Maharashtra and with proposal to have multipurpose port at Tadadi Karnataka, the situation is expected to improve. However, with growing demand & BMEC proposals, the region demands a large scale International Standard Port facility. This can also act as a Transshipment Terminal to BMEC region and also to rest of the ports along the northern part of west coast. NMPT or Tadadi Port can be explored to be developed as an International Transshipment Terminal cum Multipurpose Port facility. However, connectivity across Western Ghats would be a challenge and connectivity through Tunnels would be shortest. This will serve as a relatively eco friendly solution and the same shall be explored as part of the proposal.
4. **Creation of Green/ Sustainable Mega Cities as Urban Centers** of the Corridor would be the primary focus of creation of Urban Infrastructure along the corridor region. The proposal to develop a Greenfield Mega City would be conceptualised to be developed as a Green City. Masdar City is been referred as a benchmark for developing such Green Cities and the same is studied as part of this report.



5. **Creation of Green Infrastructure/ Green Spaces System:** Increasing the existing greenery, vegetative cover/ tree cover, creation of urban forestry with an objective to increase the Green Cover of the entire Corridor Regions will be the primary focus of the Green Vision cum Environmental enhancement programme of Corridor Region. This will be carried out creation of Green Space System across the entire corridor and as integral part of the proposed developments.
6. **BMEC as Global Hub for High End Industries:** Establishing, BMEC as an hub of high end Industries/ Region of Excellence/ Hub of Advanced Technological Industries would be the prime focus in the process of identifying an appropriate Sectors & product mixes for the region. Aviation, Aerospace, Space Technology, Precision Engineering, High Value Engineering Industries etc. would be the target sectors for the region. With the region already having some of the major aviation/ aerospace supply chain ecosystem has the best opportunity to emerge as a global hub.



7. **Economic Vision of BMEC**: The economic vision for BMEC is to be viewed from the context of value-addition, sustainability, and inclusive aspects of development. The long term vision for the BMEC is to develop itself into a sustainable, inclusive, and globally competitive economic region.

4. Bengaluru – Mumbai Economic Corridor (BMEC) Region: Profiling of Corridor States

After discussing the economic, industrial & infrastructure scenario of the country, understanding India's position in global market, BRICS and assessing emerging trends across the world, the report focus shifts to the project BMEC states. The following part of the report would study & discuss the BMEC region.

The proposed Bengaluru Mumbai Economic Corridor runs through two states having some of the most vibrant economies in the country, namely Maharashtra and Karnataka. The Government of India intends to develop the Bengaluru Mumbai Economic Corridor (BMEC) between Bengaluru and Mumbai, which would have an influence area spread across the **states of Karnataka and Maharashtra**, covering an overall length of approx. 1,000 km. Hence a preliminary study of the existing scenarioof these two states at the sectoral level is a prime necessity in order to understand the study area/region, its potentials, and issues and arrive at an understanding of the influence zone for the BMEC which would eventually lead to the delineation of the corridor region. This section of the report aims to carry out a detailed scenario assessment of various sectoral components such as **Administrative divisions, Demography, Ecology and Environment, Land use, Transport (Road, Rail, Ports, Airports), Power, Economic &Industrial profile of the corridor state, Major Industrial & Infrastructure Initiatives, Policies etc. of the two Corridor States.The prominent districts of the BMEC states are identified from the analysis of the state of profiles which forms the basis of the delineation of the corridor.** Final delineation of the region is carried out in the subsequent chapter.

The highlights of the state profile analysis are as given below in a tabular format which presents the sector wise highlights of the BMEC states along with the prominent districts identification:

4.1 AdministrativeDivisions

- The total of the BMEC states' area contributes to about 15.2% of the total area of India.
- The two states cover a total area of 499504 sqkm with Maharashtra covering 307713 sqkm& Karnataka covering 191791 sqkm.

	MAHARASHTRA	KARNATAKA
DISTRICTS	**35**	**30**
DIVISIONS	**6** Mumbai (Konkan), Nashik, Aurangabad, Amravali, Pune and Nagpur	**4** Bengaluru, Belagavi, Kalaburagi and Mysuru
TALUKAS/SUB DISTRICTS	**355**	**176**

4.2 Demography

Highlights		Maharashtra	Karnataka
Population 2011	Total	11,23,74,333	**6,10,95,297**
	Urban	45.2%	**38.67%**
	Rural	54.8%	**61.33%**
Decadal Growth Rate of Population (in %)	2001-2011	15.99	**15.6**
Sex Ratio	2001-2011	929	**973**
Population Density (per sq km)	2001-2011	365	**319**
Literacy Rate (in %)	2011	82.3	**75.36**
Work Force Participation Rate (WPR)(in %) 2011	Total	44.0	**45.62**
	Urban	36.9	**39.66**
	Rural	49.8	**49.38**
Share of Main Workers (in %) 2011	Total	88.5	**83.94**
Share of Marginal Workers (in %) 2011	Total	11.5	**16.06**
Human Development Index (HDI)	2011	Value: 0.572	**Value: 0.519**
(Source: Indian HDI Report, 2011 using 2007-08 data)		All India Rank: 7	**All India Rank: 12**

Population

State	Prominent districts
Maharashtra	Thane (9.8%), Pune (8.4%) Mumbai sub urban (8.3%)
Karnataka	Bengaluru urban district (15.7%) followed by Belagavi (7.8%) and Mysuru (4.9%)

- The total population of the BMEC states contribute around 14.3% to the total population India
- The most populous districts within the states fall near to NH4 and is in proximity to the proposed Bengaluru Mumbai Economic Corridor.

Decadal Growth Rate 0f Population

State	Prominent districts
Maharashtra	Thane (36.01%), followed by Pune (30.4%) and Aurangabad (27.8%).
Karnataka	Bengaluru urban (47.18%), Yadgir(22.81) and Ballari (20.99%).

- The population growth rate is decelerating compared to the previous decade's (1991-2001) growth rate for both the states, which essentially follows the trend of India.
- Most of the districts which have higher decadal growth rate fall in the possible influence area of the proposed BMEC corridor.

Population Density

State	Prominent districts
Maharashtra	Mumbai (sub-urban), Mumbai & 19,652 persons per sqkm respectively 20,980
Karnataka	Bengaluru district with 4381 persons per sq km Mysuru with 476 persons per sq km

Those districts through which the NH4 and the rail links connecting Bengaluru and Mumbai passes through or is in close proximity to those, has a higher density of population.

Urban Population Share

State	Prominent districts
Maharashtra	Mumbai, Mumbai sub urban and Thane districts >75%, Pune >50%
Karnataka	Bengaluru urban district->75%, Dharwad>50%

- **The BMEC states- Karnataka and Maharashtra exhibitshigh degree of urban primacy**, The districts with high urban population share within the study area, have the NH4 passing through and will fall within the possible influence zone of the proposed BMEC corridor.

Sex Ratio

State	Prominent districts
Maharashtra	Ratnagiri 1123 females per 1000 males
Karnataka	Udupi 1094 females per 1000 males

WPR

State	Prominent districts
Maharashtra	Gadchiroli54.5%
Karnataka	Chitradurga51.62%

Literacy Rate

State	Prominent districts
Maharashtra	Mumbai sub urban 89.9%
Karnataka	Dakshina Kannada88.57 %

- The districts along the NH4 and rail link via Belagavi Sangli which would form the possible influence area for the BMEC corridor have a comparatively higher literacy rate, which in turn indicates the presence of a large section of population with potential skill sets.

4.3 Ecology and Environment

Physiography

State	Prominent districts(*maximum percentage of the district with flatter terrain)*
Maharashtra	Solapur (67.54%)
Karnataka	Bidar (68 %).

- Most of the area of interest of BMEC states falls within the elevation range of 500 to 900 m from the mean sea level.
- Dakshin Kannada and Kodagu have high values of slope and a steeper terrain and hence will not be suitable for development of the industrial corridor region.

Forest

State	Districts (with high forest cover)- To be excluded from the corridor
Maharashtra (16.45% of area with forest) cover)	Gadchiroli (10094 sqkm)
Karnataka (18.84% of area with forest) cover)	Uttar Kannada (8155 sqkm)

- Most of the districts through which the NH4 passes through, have forest cover 20% or less of the total area of the districts.

Surface Hydrology Density

Most part of Karnataka and Maharashtra which fall in the study area is in the Krishna river basin.

River Basin	% of area of the basin in Karnataka	% of area of the basin in Maharashtra
Krishna	43.83%	26.36%
Cauvery	42%	nil
West flowing rivers from Tadri to Kanyakumari Basin	25.42%	nil
West flowing rivers from Tapi to Tadri Basin	19.21%	56.97%
Pennar Basin	12.52%	nil
Godavari	1.40%	48.70%

Rainfall

State	Prominent districts*(maximum rainfall)*
Maharashtra	Ratnagiri
Karnataka	Dakshina Kannada, Kodagu

- The western side of NH4 there is larger areas with lesser rain fall distribution, where as the eastern side of NH4 has areas with heavy rainfall which is predominantly the Ghats areas.

ESA

- Western Ghats is an important geological landform on the fringe of the west coast of India, global biodiversity hotspot and a treasure trove of biological diversity. Since the majestic Western Ghats falls within the studied states for the BMEC corridor, it is imperative that a proper understanding of the feature along with its ecological sensitivity is undertaken and is appropriately addressed in the perspective plan for BMEC region.
- Based on the High Level Working Group's (HLWG) report on Western Ghats and the draft notification of MoEF dated 10.03.2014, the ecologically sensitive areas (ESA)of Western Ghats in the study area is plotted

  The table below gives the ESA within the BMEC states Maharashtra and Karnataka.

State	Western Ghats Ecologically sensitive area (in sq. km.)	No: of Villages having ESA
Karnataka	20668	1533
Maharashtra	17340	2133

4.4 Land Use

Agriculture & Waste lands

- About 37% of Karnataka's area is under the single crop followed by about 22% under the double crops. As per the data available of the selected districts in Maharashtra, 42% is single crops areas
- In the subsequent analysis within the section, parameters like agriculture (with double crop, aqua culture and agriculture plantations), predominantly single crop areas and waste land categories are analysed in detail in this section. The highlights are as given below

State	Prominent districts Karnataka	Prominent districts in Maharshtra
with maximum double crop areas	Bengaluru Rural (60%)	Kolhapur (25.5%)
Maximum single crop area	Kalaburagi (about 60% of the area)	Solapur (68.8%)
Maximum waste land categories	Koppal (67% of the area)	Solapur (82.2%)

4.5 Transport

		MAHARASHTRA	KARNATAKA
Highlights	**Total Road Network**	4.11 lakh km (1.02% NH,8%SH, 48.9% PWD roads, 42.1% Rural & others)	2.81 lakh km (1.6% NH,7.4%SH, 17.7% PWD roads, 73.3% rural & others)
	The two states contribute 10.04% to the country's road network.		
	Road Index	133.41 km/ 100 sq km	146.92 km/ 100 sq km
	Rail Network	5601 km	3007 km
	Electrified Rail Network	36.87%	5.35%
	The two states contribute 13.43% to the country's rail network of which 25% is electrified		
	Airports	TOTAL 21: 2 International and 19 Domestic and others	TOTAL 11: 2 International and 9 Domestic and others
	Ports	TOTAL: 50 2 Major Ports 48 Non-Major Ports	TOTAL: 11 1 Major Port 10 Non-Major Ports

4.6 Power

		MAHARASHTRA	KARNATAKA
Highlights	**Total Installed Capacity, 2013**	32505.98 MW	13940.66 MW
	The total installed power capacity of the two states is almost 20% of the installed power capacity in the country.		
	Peak Demand, 2012	21069 MW	10545 MW
	Peak Supply, 2012	16417 MW	8549 MW
	Deficit, 2012	22%	19%

4.7 Economic & Industrial Profile of Corridor States

		MAHARASHTRA	KARNATAKA
Economy Highlights	**Contribution to GDP (2011)**	16%	5%
	Secondary sector contribution to GDP(2011)	16%	6%
	Expected growth rate of GSDP at constant (2004-05) prices, from 2013-14 to 2014-15	8.7 %	7.0%
	Prominent districts in terms of GDDP at constant prices of 2004-05, for 2011-12	Mumbai (Mumbai and Mumbai sub urban included)-181308 (INR crore) Thane 109245 (INR crore)	Bengaluru Urban (95971 INR crore) Belagavi (16078 INR crore)
	Prominent districts in terms of per capita NDDP at current prices for 2011-12	Mumbai (Mumbai and Mumbai sub urban included) with Rs1,51,608, Pune Rs1,40,570	Bengaluru Urban with Rs 183608 Kodagu district with Rs 102074
Industry Sector Highlights		MAHARASHTRA	KARNATAKA
	Manufacturing sector CAGR 2007-2015	**2%**	**3.3%**
	As per the ASI 2011-12, Karnataka ranks second in terms of gross valued added (GVA) (11.51%), fourth in terms of output (6.84%) and fifth in terms of employment (6.75%) on an all India basis in the organized sector. **Maharashtra ranks first in the country in terms of output (17.41%), GVA (18.34%) and second in terms of number of factories in operation (12.87%), fixed capital (13.39%) and employment (14%)**		
	Major industrial & infrastructure initiatives-NIMZs	***Dighi NIMZ-Raigad***	***Vasathanarasapura NIMZ-Tumakuru, Mulbagal NIMZ-Kolar,***
	Other Major Investment Regions		***(VADA)Investment Region-Ballari, Managalore SEZ & ITIR, Devanahalli***

- Prominent districts in terms of Presence of Large industries (Karnataka) is Bengaluru Urban (278).

1. ***Dabhol- Bengaluru Gas Pipelines (Maharashtra& Karnataka),*** Corridor Initiatives:***Suvarna Karnataka Development Corridors (SKDC) (Karnataka) & Chennai- Bengaluru Industrial Corridor (CBIC) are other major initiatives within the states.***

	Major Industrial sectors in Karnataka	Highlights
Over view of existing industrial sectors	**IT/ITES**	Largest software exporter of the country with electronics and computer software exports totaling INR 156,000 crore in 2012-13 Bengaluru is known as fourth largest IT cluster in the world State has 47 IT/ITES SEZs and dedicated IT investment regions with 2,160 companies
	Biotechnology	State accounts for 60% biotech units in the country More than half of the biotech companies in the country are located in Karnataka Proposed biotech parks to be established in Dharwad, Mangaluru and Mysuru
	Engineering	State exported engineering products of value INR 12,568 crores at current prices Key players in the state include Bharat Earth Movers Limited, Hindustan Machine Tools Limited and Bharat Heavy Electricals Limited Several engineering exporters are based in Bengaluru, Hubballi, Mysuru, Belagavi, Mangaluru, and Shivamogga Precision engineering SEZ established in Belagavi
	Textile and garments	State accounts for 20% of national garment production and 8% national exports Approximately 0.38 million manufacturing units in the state under organized and unorganized level Plans to develop dedicated apparel zones in Bengaluru Rural, Tumakuru, Kolar, Mandya, Belagavi, Bidar and Dharwad
	Agro and food processing	Largest producer of coffee and cocoa in the country accounting for 70% of coffee production in India Food parks being established in Bengaluru rural, Tumakuru, Shivamogga, Davangere, Vijayapura and Belagavi Major players include Hindustan Unilever, Britannia and Nestle India
	Aerospace	State produces more than 25% of India's aircraft and spacecraft ISRO and DRDO establishments present in the state India's first aerospace SEZ operational at Belagavi Dedicated aerospace policy in Karnataka

	Major Industrial sectors in Maharashtra	Highlights
Over view of existing industrial sectors	**Pharmaceuticals and Biotechnology**	State accounts for 18.4% of the country's output by value Major clusters in the state include Mumbai, Thane, Tarapur, Aurangabad and Pune. New planned cluster Lote-Parshuram in Ratnagiri Strong R&D base with 3,139 Pharmaceutical manufacturing units
	IT/ITES and Electronics	State accounted for 23.2% of country's software exports (made by rEgistered units through STPI) Maharashtra accounts for 37 public IT parks established by MIDC and CIDCO and 107 functional private IT Parks Major clusters in the state include Greater Mumbai, Pune, Thane, and Nashik
	Engineering	Important player in production and export of engineering goods from the country Major production centres include Mumbai-Pune belt, Nagpur, Aurangabad, Nashik and Kolhapur Diversified production base with products in range of machine-parts, castings, forgings, industrial machinery
	Textiles	State contributes 10.4% to country's textile and apparel output Maharashtra government has established 14 textile parks and the sector is largest employer in the state Major players operating in the state include Raymond, Bombay Dyeing and Siyarams
	Auto and auto components	Maharashtra accounts for 38% of country's output of automobiles by value Major hubs in state include Pune, Nashik, Aurangabad and Nagpur Pimpri-Chinchwad is the largest auto hub in the country with more than 4,000 units

Other major parameters reviewed in this chapter are:

1. Role of various Govt agencies in promotion of industrialization
2. State's initiatives in promoting industrialization of the state are also reviewed in this section.
    a. Some of the existing policy initiatives for industrial, infrastructure development , land acquisition, trade etc. which would play a key role in the preparation of the perspective plan for BMEC are summarised as part of this section.
3. Systems of land acquisition/ allotment for industrial development are also described in this chapter.

4. Extensive stakeholder interactions were undertaken as part of the market assessment module including government agencies, private players and industry associations including FICCI, CII and ASSOCHAM. This section highlights the key considerations which emerged as a result of stakeholder interactions for BMEC corridor development.

Given below is the compilation of the BMEC state profiling maps which illustrates the prominent areas corresponding to the respective parameters of analysis.

Figure: GIS based Mapping & analysis for BMEC States

Demography

Demography: Population

Demography: Decadal Growth

Demography: Population Density

Demography: Share of Urban Population

Demography: Sex Ratio

Socio Economic: WPR

Demography

Socio Economic: Literacy Rate

Ecology And Environment

Environment: Elevation

Environment: Slope

Forest Cover

Forest Type

River Basins and Major Reservoirs

Ecology And Environment

Environment: Ecologically Sensitive Areas (ESA)

Land Use

Land Use

Land Use

Agriculture (Double Crop + Plantation)

Agriculture (Single Crop)

Wasteland, Fallow Land, Single Crop & Mining

Transport

Roads

Bengaluru - Mumbai Rail Connectivity

Rail Electrification

Transport

Airport

Ports

Power

Conventional Power

Power

Renewable Energy (Solar)

Renewable Energy (Wind)

Renewable Energy (Small Hydro Power)

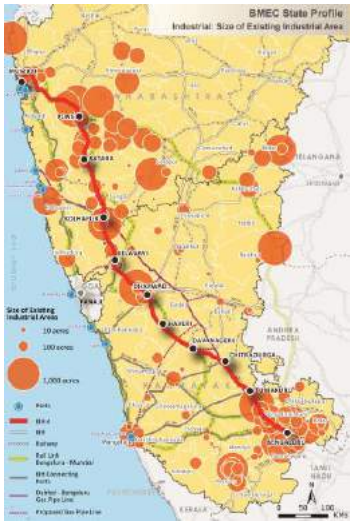
Economic & Industrial Profile

GDDP

Per Capita Income

Location of KIADB, MIDC & Other Industrial Estates

Industrial Areas



Size of Existing Industrial Area

5. Delineation of BMEC Influence Region

5.1 Objective of Delineating the Corridor Region

The prime objectives of delineating the corridor region are:

- To define the extent of BMEC Planning area which will be governed by this perspective plan
- To define a region between Bengaluru and Mumbai which will remain as the primary focus for Industrial & Economic development proposed through this perspective plan
- To identify a region, which would emerge as a Globally Competitive and sustainable, Investment cum manufacturing destination
- Defining a region, which would be assessed to identify best possible locations for Industrial Nodes & its allied infrastructure developments
- Defining a region which will be influenced through proposed industrialisation & economic activities
- Also to carefully & scientifically delineate a region which will excludes the environmentally & ecologically sensitive areas, areas rich in agriculture etc. from the process of industrialisation, urban development & its related impacts.

This section elaborates the detailed exercisecarried out in delineating the corridor influence region through a scientific process considering various parameters. The assessments in the chapter wouldexplore the possibilities of delineating the Corridor Region and the primary parameterswhich would play a crucial role in defining the region. Through a process of deductive and inductive reasoning and prioritisation of various parameters, the corridor region boundary is being delineated. The delineation process was carried out through the following two primary stages.

1. **Identification of preliminary influence zone**
2. **Detailed delineation of the influence region**

5.2 Identification of Potential Districts of the Corridor States

The following assessment would explore the possibilities of preliminary influence zones for the BMEC. The objectives of this stage are

- **To understand and establish the most potential districts in the region and**
- **To identify the primary infrastructure networks which the further detailed delineation of BMEC will be based.**

The preliminary influence zone identified would further be streamlined and delineated based on various parameters to identify the BMEC influence region in the subsequent section of detailed delineation.

To identify the possible preliminary influence zone of Bengaluru- Mumbai Economic Corridor the following stages are considered.

1. Identification of Prominent districts

- by comparative analysis of the district-wise share based the analysis of various parameters carried out under states' profile in the previous section of this report

2. Prominent transport and infrastructure networks identification through

- Existing Major Urban Centres& Hierarchy of Settlements
- Existing & proposed Industrial Developments

3. Establishing the preliminary influence districts based on distance from the identified important networks.

Based on the analysis of the above parameters, possible extends of influence zone is identified.

• IDENTIFICATION OF POTENTIAL DISTRICTS OF THE CORRIDOR STATES

Map: Prominent districts based on state profiles

Source:Egis

On the basis of states' profile carried out under various parameters for the two corridor States as described in the earlier chapter on state profiling, an evaluation of the districts in the study region is being done in order to identify the most potential districts of the two States within the corridor region. A comparative analysis on the relative performance of the districts in terms of

- **demographic indicators,**
- **ecology and environment,**
- **land use/utilisation,**
- **transport,**
- **power,**
- **economic and industrial scenario etc**

are done and a relative ranking is assigned. The districts identified were graded as per their potential for development as an economic corridor region. The environmental and ecological concerns are also considered while grading. The graded potential districts based on the study on state profiles are as illustrated.

The prominent districts from the state profile analysis are:

Grade 1	Grade 2	Grade 3
Mumbai	Satara	Raigad
Thane	Kolhapur	Sangli

Pune	Belagavi	Ahemdnagar
Bengaluru	Dakshina Kannada	Chitradurga
	Dharwad	Davanagere
	Solapur	Hassan
	Ballari	Haveri
	Tumakuru	Koppal
		Mysuru

- **PROMINENT TRANSPORT AND INFRASTRUCTURE NETWORKS IDENTIFICATION**

THE MAJOR TRANSPORT CORRIDORS within the BMEC states' are of interest are as listed below:

- National Highway 4 (NH4)
- Other NHs in the region
- Bengaluru – Mumbai Rail link via Hubballi-Dharwad, Belagavi, Satara & Pune
- Bengaluru- Mumbai Rail link via Raichur, Kalaburagi, Solapur & Pune
- Bengaluru- Mumbai Konkan Rail link via Mangaluru& Panaji
- Other rail links within the region.

INFRASTRUCTURE NETWORKS

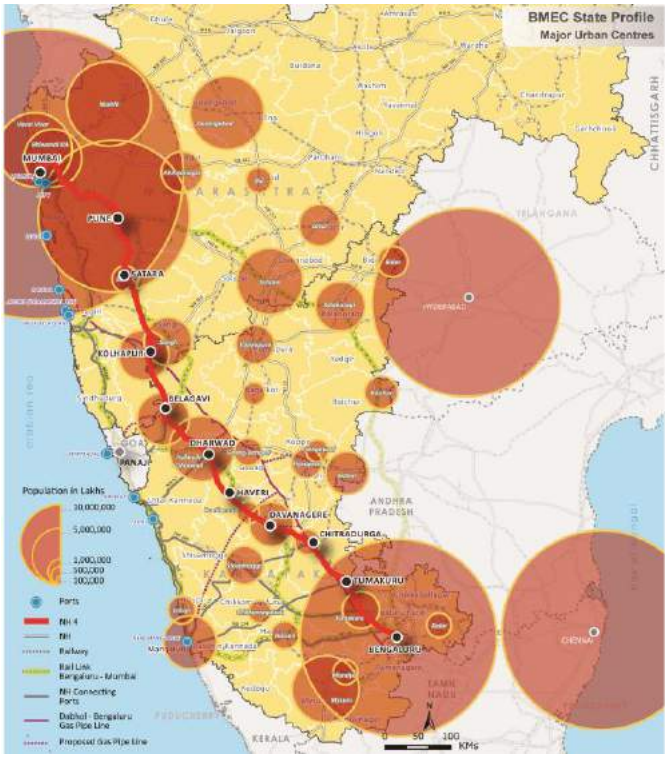
Other major component which would influence the corridor region is the Dabhol- Bengaluru Gas pipeline. This would act as one of the major infrastructure network & life line of the region. As per preliminary information gathered this pipeline runs along the NH4 with a distance of almost around 50 to 70 kms away. It also has its spur lines connecting to all major Urban Centres along NH4 and also to Panaji. The map above also shows the alignment of the pipeline along with the transport corridors.

URBAN CENTRES - HIERARCHY OF SETTLEMENTS

In order to understand the size & number of major urban centres within the study area on the transport networks, a mapping of all the major urban centres along these networks within the States of Karnataka & Maharashtra was carried out based on the population of these centres.

The influence areas of major urban centres based on population size are plotted in the map given below:

Map: Major Urban Centres based on Population-2011 for the region



Source: Census of India, Mapping and analysis-Egis

This mapping indicate that the NH4 alignment covers almost more than 11 urban centres with a population of more than a lakh, when compared with other alignments

Further, this mapping illustrating population size based influence zone of each urban centres, indicate that apart from Mumbai &Bengaluru cities which overlaps with the influence zones of other major centres like Pune, Nasik (with Mumbai) and Chennai &Mysuru(with Bengaluru) respectively, there other Urban centres which overlaps and form a **continues Urban corridor along NH4. This includes Kholapur- Sangli, Belagavi- Hubballi- Dharwad- Haveri and Davangere- Chitradurga**. This mapping also **illustrates the emerging corridor development between Hyderabad & Mumbai covering Bidar, Kalaburagi, Solapur, Latur and Pune.**

This strong corridor further strengthens the fact that

- **NH4 will act as the spine of the corridor region.**
- **The next prominence will be for the rail link connecting the two cities via Belagavi and Sangli as it passes through the urban corridor connecting some of the major centres such as Dharwad, Belagavi and Kolhapur**

EXISTING AND PROPOSED INDUSTRIAL DEVELOPMENTS: **NIMZ at Tumakuru& NIMZ at Dighi** are the two major proposed Industrial zones within the study area. There are major industrial activities around **Satara, Kholapur, Solapur, Sangli, Belagavi, Hubballi- Dharwad, Davangere and Chitradurga which** also falls within the study area. Apart from these areas Steel Zone/ VADA area covering Hosapete- Ballari region, proposal for NIMZs at Kalaburagi& Bidar etc. are also at a distance of about 100 to 250 kms from the main NH4.

Among the above-mentioned assessment based on transport, infrastructure networks, Urban centers & existing & proposed industrial developments across the study area, it has clearly emerged that the **NH4, the Rail link via Hubballi- Belagavi – Sangli & the Gas Pipeline** together will act as the spinal alignment of the corridor region.

- **ESTABLISHING PRELIMINARY INFLUENCE DISTRICTS**

Map: Preliminary influence zone emerged from the sectoral analysis

Source: Egis

The prime idea is to understand the spatial pattern emerged from the **state level sectoral analysis along with the transport, infrastructure and urban corridors**.

Prominent districts emerged from state profiling are over lapped with the prime influence region of the transport and infrastructure corridors considering that NH4 will act as the core along with the rail link and infrastructure network, the extent of the corridor influence zone was explored. The preliminary influence districts are established based on distance from the identified important networks.

Based on the above parameters, the districts which would come under the influence of the BMEC region is identified. The map here gives an idea of the possible influence zones taking the NH4, rail link via Belagavi Sangli and Dhabol Bengaluru gas pipe line, as the spines and the districts under the influence. The detailed delineation of the identified preliminary influence zone is carried out in the subsequent section.

5.3 Detailed delineation of the BMEC influence Region

From the above exercise the preliminary influence zone of the region is identified along with the major parameters that need to be considered for the region identification. A streamlining and further analysis of the same is required in order to arrive at the final delineated Corridor region. As already indicated, BMEC corridor is conceptualized to be the region around the main transport spines connecting Bengaluru and Mumbai, with NH4 serving as the major spine. The following section is built up on the previous stage of identification of preliminary zone, and this exercise identifies and delineates the final boundary of the BMEC Region.

5.3.1 BenchmarkingOptimal Range of Influence Zone

In order to arrive at an optimal range of influence zone for the corridor delineation, certain studies were done to benchmark the range. The two major cases considered for benchmarking are:

a) Spatial extent of Metropolitan Regions[1]

b) Influence zone of major corridor developments

Table: Spatial extent of metropolitan regions- India

Metropolitan Region	Radial extent
Bengaluru Region	40 KM
Mumbai Region	50 KM
NCR	115 KM

Source: BMRDA, MMRDA and NCRPB official websites

Table: Influence zone range of major corridor developments

Major Corridor Development	Radial extent	
DMIC	150-200 KM	National level
CBIC	75-100 KM	
MIEC	80-100 KM	International level

Source: DMICDC; Final Plan Report - Perspective Plan for DMIC Region; CBIC; Economic Research Institute for ASEAN and East Asia (ERIA) (2009). Mekong-India Economic Corridor-Concept Paper

From the above cases, it is understood that the prominent metropolitan regions within the conceptualized BMEC corridor region, Bengaluru and Mumbai have a radial extent of about 50 km and the major corridor developments have an influence zone ranging from 75 to 200 km, out of which two of the corridor projects and the National Capital Region have an extent around 100 km.

Considering these cases, **the optimal range of influence zone on either side of the freight corridor is taken as 50-100 KM.**

5.3.2 Criteria Defining Corridor Influence Region

The various parameters considered for defining of corridor region is as following.

1. **Transport Network**
2. **Infrastructure Network**
3. **Connectivity to Ports**
4. **Major industrial developments**
5. **Ecologically Sensitive Areas of Western Ghats and Environmental parameters**
6. **Influence of other potential corridors**

Influence zones of these above mentioned corridors and industrial developments are identified taking the optimal influence zone buffer (50 -100 km) on either side of the corridors and the sub-districts which fall within these buffer bands are identified[2].

[1]The radial extents of the region from the city centre to the administrative boundary of the metropolitan regions are considered for arriving at the values.

TRANSPORT NETWORK

The major transport corridors considered for the delineation are:

I. **National Highway 4 (NH4)**

II. **Bengaluru-Mumbai Rail link via Belagavi& Sangli**

I. National Highway 4 (NH4): The National Highway 4 connecting Bengaluru& Mumbai is the shortest major road link between the two cities. It is part of the Golden Quadrilateral network and facilitates the maximum movement of passenger & freight between the cities. It passes through Pune, Satara, Karad, Sangli (Peth), Kolhapur, Belagavi, Dharwad, Hubballi, Haveri, Ranibennur, Davangere, Chitradurga, Tumakuru. NH 4 has four lane dual carriageways throughout majority of the stretch.

This acts as one of the prime determinants in defining the corridor region. The total length of the NH4 segment from Bengaluru to Mumbai is about 980 Km. 50 km as well as 100 km buffer is taken from both sides of the NH4 to identify the areas under the influence zone of the NH4. NH4 and the sub-districts falling within the buffer of 50 km are as shown in the figure below. In order to identify a maximum range of influence zone for the NH4, a buffer of 100 km is taken on either side of the NH. The influence zone band width of 100 Km extend uptil Kolar and Chikkbellapur in the south east and covers Mandya, Shivamogga, Uttar Kannada and all the coastal districts till Mumbai further north-west. NH4 and the sub-districts falling within the buffer of 100 km are as shown in the figure below.

Total numbers of sub-districts falling within this range of **50 km buffer** on either side of **NH4** are **117**

Total number of sub-districts which fall within this influence zone of 100 km buffer to NH4 is **209** about 107 in Karnataka and rest in Maharashtra.

II.Bengaluru-Mumbai Rail link via Belagavi& Sangli

This is the shortest rail alignment between the two cities running almost parallel or along the NH4. The total length of this rail link is about 1205 km. It passes through Davanagere, Dharwad, Belagavi, Sangli, Pune. A 50 km buffer is taken from both sides of the rail link and the sub-districts falling within the buffer are identified as shown in the figure below.

Total numbers of sub-districts falling within this range of 50 km buffer on either side of the Bengaluru- Mumbai Rail Link via Belagavi& Sangli are **128**.

[2]The sub-districts with negligible portion of its area falling under the buffer region are excluded from the selection. Similarly those sub-districts with about 50 % of its area falling within the buffer zone is included in the selection.

Map: Sub districts within 50 km buffer to NH4

Map: Sub districts within 100 km buffer to NH 4

Map: Sub districts within 50 km buffer to rail link via Belagavi& Sangli

Source: Egis

DABHOL- BENGALURU GAS PIPELINE (Infrastructure Network)

Dabhol- Bengaluru Gas Pipeline is the major infrastructure network which would influence the corridor region. Gas Authority India Limited (GAIL) has implemented the 1414 km long LNG pipeline between Dhabol and Bengaluru which passes through the States of Maharashtra, Karnataka & also connects Goa. The Phase I of the project which is already commissioned is around 993 Km and Phase II covers a length of 417 km which are basically the spur lines. This would act as one of the major life line of the region. This pipeline runs almost parallel to NH4 and falls within the corridor region covering the Ratnagiri, Satara, Kholapur districts of Maharashtra, Belagavi, Dharwad, Gadag, Davangere, Ballari, Chitradurga, Tumakuru, Bengaluru& Ramanagar districts of Karnataka. The spur lines connect to Sangli of Maharashtra and North & South Districts of Goa. A50 km buffer is taken from both sides of the network and the sub-districts falling within the buffer are identified as shown in the figure given below. Total numbers of sub-districts falling within this range of 50 km buffer on either side of the Dhabol- Bengaluru Gas pipeline are 71.

Primary Influence zone of BMEC: The combined influence zones of the transport and infrastructure forms the primary influence zone of the BMEC region. The figure below shows the primary influence region of BMEC.

Map: Sub districts within 50 km buffer to gas pipe line

Map: Preliminary influence zone of BMEC

Source: Egis

Total numbers of sub-districts falling within the primary influence zone which is the combined influence zone of NH 4 (980 km), Bengaluru-Mumbai Rail link (via Belagavi& Sangli (1205kms) and Dabhol-Bengaluru Gas pipeline (1414km) are **209 sub-districts.**

CONNECTIVITY TO PORTS

Sea Ports have been a significant factor in facilitating the integration of markets formanufacturing sector, and the overall economic development of the region. Hence it is imperative that we include the connectivity towards the important ports of the region from the NH4 and the connectivity among the ports (NH17 & Konkon railways) in determining the overall influence zone of the Bengaluru Mumbai economic Corridor. The major ports of the region considered are as listed below:

- New Mangalore (Major Port)
- Tadri (Proposed Major Port)
- Karwar
- Marmagao
- Jaigad(Lavagan)
- Jaigad (Dhamankol Bay)
- Dighi
- JNPT (Major Port)
- Mumbai (Major Port)

Map: Sub-districts within the influence zone of port connectivity

Source: Egis

The sub-districts identified are the ones which are located along theNHs, SHs, Rail lines connecting NH4, NH17 & Konkan Rail lineand the ports. Some of the major links include NH48, NH213, NH63, NH 234, NH 13 and NH 206. The figure below shows the sub-districts in the influence zone overlapped over the primary influence zone of BMEC.

Based on the identified influence zone, an extra 18 sub-districts are added on to the already identified primary influence zone.

CONNECTIVITY TO MAJOR INDUSTRIAL DEVELOPMENTS

The major industrial developments of the region, which will have a high impact on the corridor is also considered for the identifying the influence zone of the BMEC. The major industrial initiatives of the region which do not fall in the already identified influence zone, but will have a significant influence on the corridor are:

- **National Investment & Manufacturing Zones** (NIMZ)[3]
  - Kalaburagi NIMZ (Karnataka)
  - Bidar NIMZ (Karnataka)
  - Dighi NIMZ (Maharashtra)
- **Vijayanagar Area Development Authority(VADA) Region** (to promote Steel Based industries in Ballari district- Karnataka)

The sub-districts which falls along the NHs, Rail lines & major SHs to these above mentioned industrial developments connecting the NH4 pass through is considered under the influence zone.

[3] The other NIMZs of the region are Tumakuru and Mulbagal NIMZs. Tumakuru NIMZ falls within the identified influence zone. Mulbagal NIMZ falls within the CBIC corridor region and hence not considered for the further exercise.

Along with these, the **connectivity to Solapur** is also explored as it is

Map: Sub-districts within the influence zone of majorindustrial developments

Source: GIM 2012Karnataka, DIC Karnataka, other secondary sources, Mapping and analysis- Egis

- a prominent transport hub with confluence of 4 NHs (NH 9,218,204,211), railway lines and an upcoming airport
- a prominent urban centre of the region in between 2 major hubs- Pune and Hyderabad
- located almost equi-distant from the industrial centres- Kalaburagi, Bidar, Vijayapura& Latur

NH segments considered for the identification of sub-districts within the influence region are:

- **NH 218** connecting Dharwad and Bidar via Vijayapura&Kalaburagi. This joins the NH 9 at Bidar
- **NH 9** connecting Pune and Bidar via Solapur which further connects to Hyderabad
- **NH 204** connecting Kolhapur and Solapur via Sangli.

The figure below shows the sub-districts identified overlapped over the already identified influence zone. Based on the identified influence zone, an extra 28 sub-districts are added on to the already identified primary influence zone. Out of which 4 are coming within the influence of VADA and 24 sub-districts coming within the buffer connecting Pune-Solapur-Bidar-Bagalkot.

EXCLUSION OF ECOLOGICALLY SENSITIVE AREAS (ESAS) OF WESTERN GHATS

Western Ghats is a unique eco system, an important geological landform on the fringe of the west coast of India, the origin of Godavari, Krishna, Cauvery and a number of other rivers and forms a part of UNESCO World Natural Heritage list. Realizing the need to protect and reduce the pressure of industrialization on the ecology of Western Ghats, the Ecologically Sensitive Areas (ESA) of Western Ghats within the possible BMEC region has been excluded.

The report of HLWG on Western Ghats and the Draft Notification[4] by MoEF, GoI declaring Ecologically Sensitive Area in Western Ghats published on 10th March 2014 form the basis of this exercise of exclusion of ESAs within the BMEC region.

Around 20,668 sqkm under 1533 villages in Karnataka & 17340 sqkm under 2133 villages in Maharashtra falls within the ESA of Western Ghats. The sub-districts within the influence of the identified ESA, i.e. those with the ESA villages and those which falls within a 10 km buffer of the identified ESA of the Western Ghats have been excluded. The figure below shows the sub-districts

[4] Source: S.O.733 (E) [10.03.2014]: Draft Notification declaring Ecologically Sensitive Area in Western Ghats in the states of Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu - MoEF, GoI

with ESA or which falls within the 10 km buffer of ESA overlapped over the already identified influence zone. Total number of sub-districts with the ESA villages and its buffer area are 115.

Map: Sub-districts with ESA and those within the buffer of ESA

Source: MoEF-GoI,Mapping and analysis-Egis

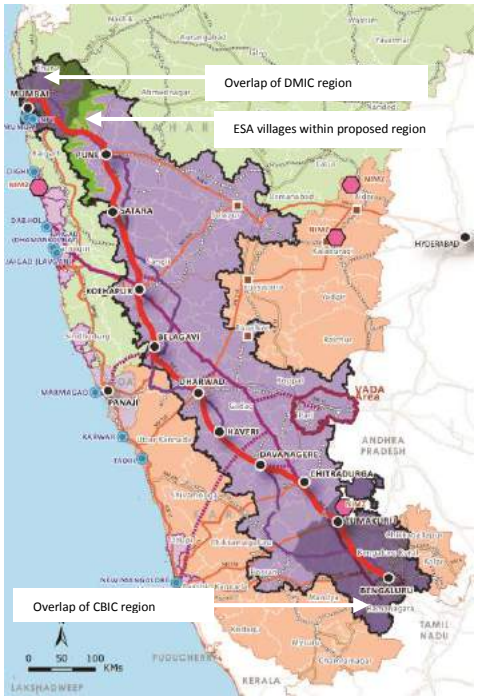
EXCLUSION OF INFLUENCE ZONES OF OTHER POTENTIAL CORRIDOR DEVELOPMENTS

Solapur, Bidar, Gulberga and Vijayapura fall within the core area of Vijayawada-Hyderabad- Pune- Mumbai NH9 & Rail link potential corridor. Hence the sub-districts identified in these areas would be predominantly influenced by NH9 Corridor than NH4 which would lead to the exclusion of these from the possible BMEC region. The figure below shows the sub-districts which would fall predominantly in the influence of NH 9 and the rail link which connects Mumbai and Hyderabad.However the sub-districts which are identified as the subsequent to the exploring connectivity to Solapur have been retained within the influence zone identified for BMEC region, Solapur being the major transport hub and urban centre and would have a significant impact on the corridor development. Therefore the final influence zone of the corridor obtained as a result of determining the possible

Map: Influence region of NH 9

Source: MoEF-GoI,Mapping and analysis- Egis

Map: Overall influence zone of BMEC



Source: MoEF-GoI, Mapping and analysis- Egis

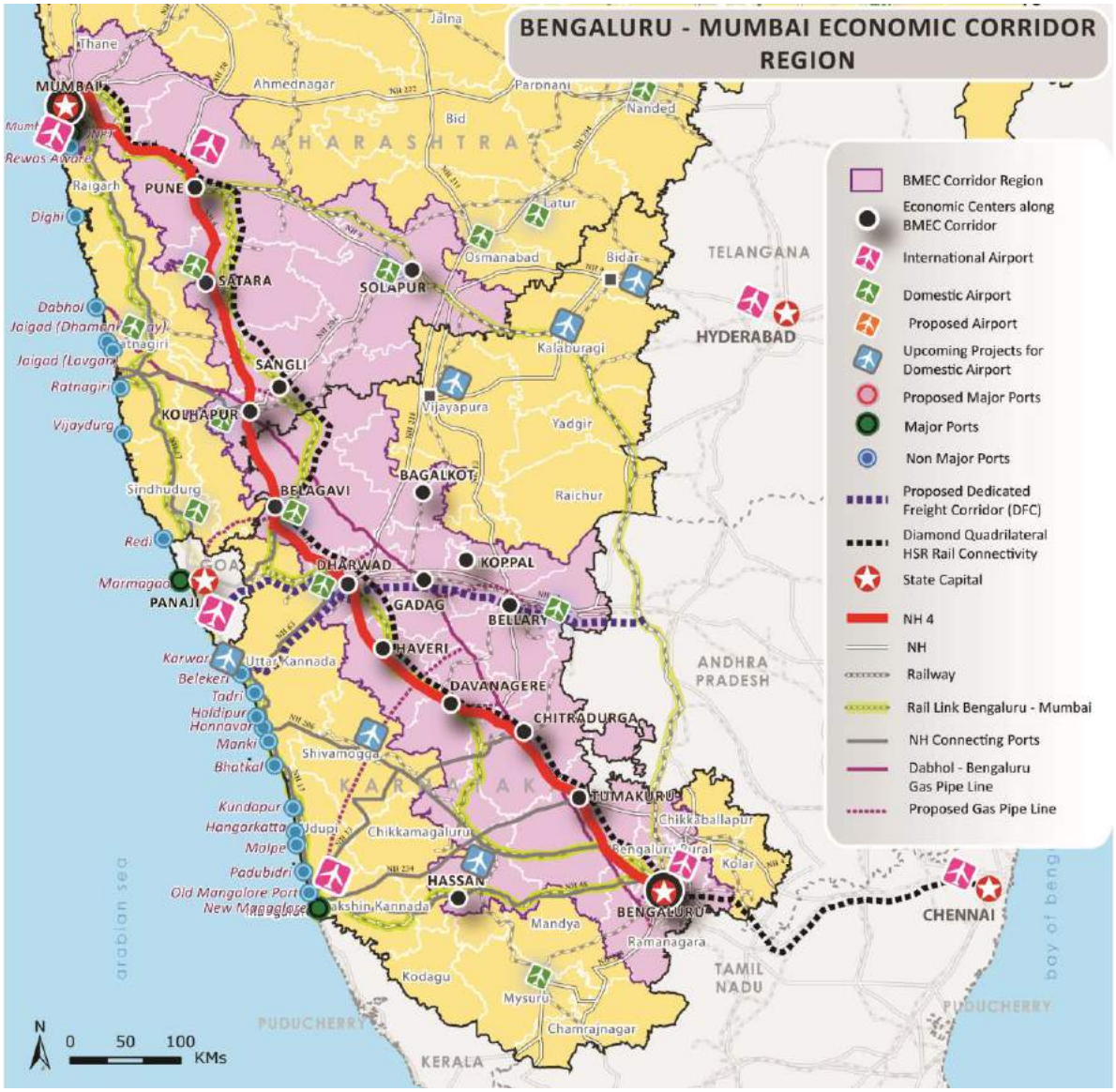
influence zones of the above described parameters is as given in the figure of overall influence zone of BMEC. The figure shows the obtained influence region of the BMEC along with the overlaps of

CBIC region & DMIC region and the included ESA (as it falls within the Pune and Mumbai region and is an invariable factor for achieving the connectivity of NH4).

5.4 Delineated BMEC Influence Region

The final delineated BMEC region derived as per the analysis of the parameters is as given below:

Map: Delineated BMEC region



Source: Egis

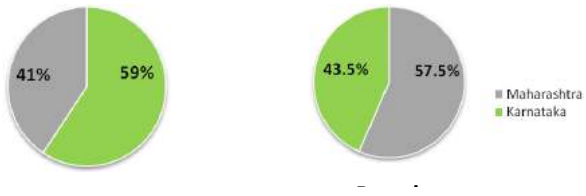
Table: BMEC Region-Basic Profile

Feature	Detail
Total Area of BMEC region	1.43 lakh sq km
Total Population	79823438 (As per 2011 census), Karnataka-34458083, Maharashtra-45365355
Districts within the region	26 (Maharashtra-9, Karnataka-17)
Sub-districts within the region[5]	146 (Maharashtra-62, Karnataka- 84)

Source: Census 2011,Analysis-Egis

[5] In Maharashtra apart from the 62 sub-districts there is the statutory town of Mumbai which falls in Mumbai and Mumbai Sub-urban districts. These districts do not have any sub-districts division.

Figure: State-wise split of BMEC Region's area and population



Source: Census 2011, Analysis- Egis

Figure: Share of BMEC region in Maharashtra

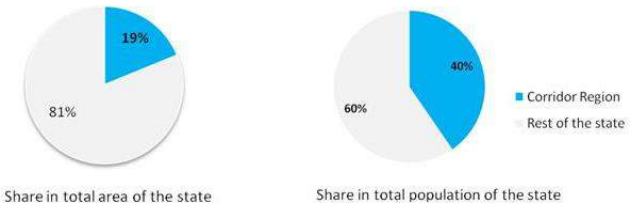
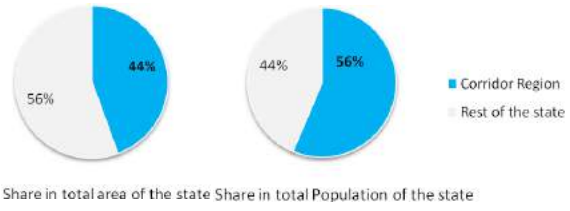


Figure: Share of BMEC Region in Karnataka



Source: Census 2011, Analysis- Egis

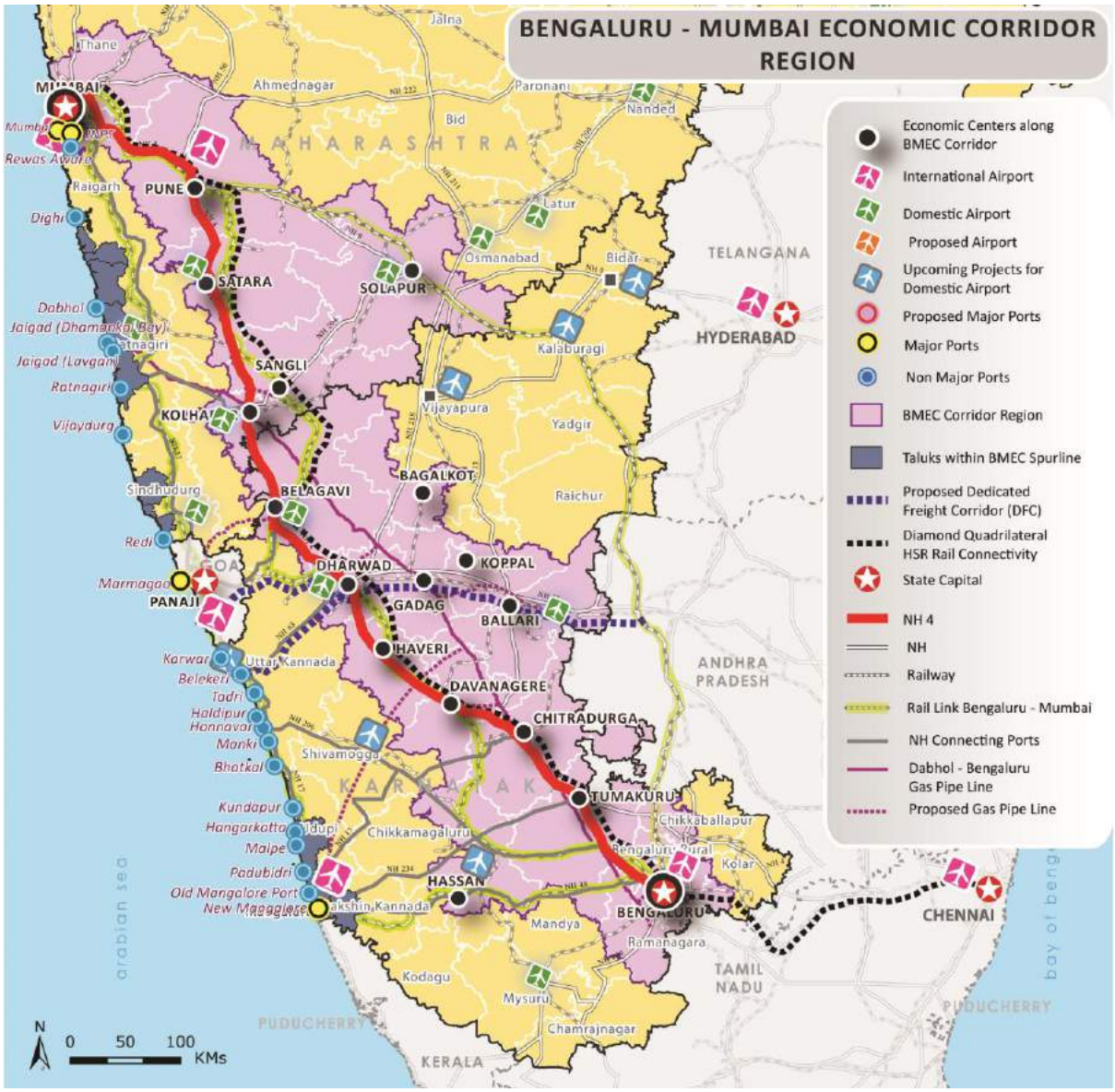
Table: Districts of Karnataka within BMEC region

Districts in Karnataka	
Gadag	Bagalkot (4 sub-districts)
Dharwad	Koppal (3 sub-districts)
Ballari	Belagavi (9 sub-districts)
Chitradurga	Chikkamagaluru (2 sub-districts)
Davenegere	Hassan (5 sub-districts)
Tumakuru	Chikkabelapur (2 sub-districts)
Bengaluru Urban	Kolar (1sub-district)
Bengaluru rural	
Haveri	
Ramanagara	
Districts in Maharashtra	
Mumbai	
Mumbai Sub urban	
Sangli (9 sub-districts)	
Pune	
Solapur	
Thane (9 sub-districts)	
Satara (9 sub-districts)	
Kolhapur (6 sub-districts)	
Raigarh (4 sub-districts)	

BMEC Spur Lines:

This essentially comprises of the non ESA sub-districts with the ports and the connectivity from NH4 and NH17 to the ports. The map below shows the sub districts under the BMEC spur lines.BMEC Spur Lines

Map: BMEC Spur Lines



Source: Egis

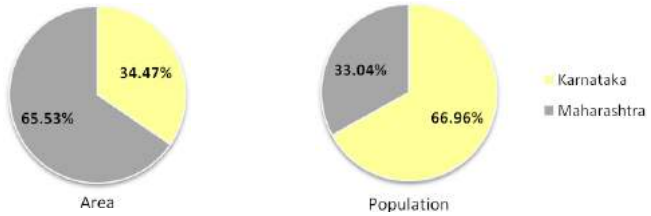
Table: BMEC Spur Lines- basic profile

Sl no:	Feature	Detail
1	Total Area under spur lines	6548.34 sqkm
2	Total Population	2916537 (As per 2011 census), Karnataka- 1952781, Maharashtra- 963756
3	Districts within the region	5 (Maharashtra-3, Karnataka-2)
4	Sub-districts within the region	10 (Maharashtra-7, Karnataka- 3)

Source: Census 2011, Analysis- Egis

The sub-districts which do not fall under the influence of ESA villages and which come under the influence of port connectivity are considered. Various possibilities for enhancing the port connectivity will be explored.

Figure: State-wise split of BMEC spur lines' area and population



Source: Census 2011, Analysis- Egis

Share of the Spur lines in the states:

List of Districts which fall within the Spur lines of BMEC is as given below:

Table: Districts within BMEC spur lines

	Districts in Karnataka
1	Dakshin Kannada (2 sub-districts)
2	Udupi (1 sub-district)
	Districts in Maharashtra
1	Raigarh (1 sub-district)
2	Ratnagiri (4 sub-districts)
3	Sindhudurg (2 sub-districts)

Source: Egis

6. BMEC Corridor Influence Region; District Profile

As per the delineation carried out in the previous section, 145 sub districts which are distributed within 17 districts of Karnataka and 9 districts of Maharashtra forms the BMEC Region.The delineated BMEC Region also comprises of overlap region of **CBIC (Chennai Bengaluru Industrial Corridor) & overlap region of DMIC (Delhi Mumbai Industrial Corridor) and these areas were already assessed for locating potential nodes as part of the perspective plans prepared for the respective regions.**

Further, there are nodes identified under these overlap regions and are already in advanced stages of plan preparation. Hence, these overlap regions are excluded from the detailed district profiling and for the Location Capability Assessmentfor potential Nodes/ Mega Cities under BMEC region. However, the districts within these overlap region are considered as part of the overall assessment and only excluded from the process of identification of potential nodes. The rest of the districts within the delineated region form the **Core Districts** for assessment. The sub-districts are considered as basic unit for the assessments of the various parameters as per data availability, the assessment is carried out at Sub-District level also within each districts. The core districts within the BMEC Region which were considered for district profile are also considered for the Location Suitability Assessment to locate the potential nodes. The number of core districts and target sub districts are given below.

Table: State Wise Number of Core Districts and Sub Districts in BMEC

State	No.of Core districts for assessment of nodes	No. of Target sub districts for assessment of nodes
Karnataka	11	59
Maharashtra	5	49
Total	**16**	**108**

The core districts considered in Karnataka and Maharashtra are as given below.

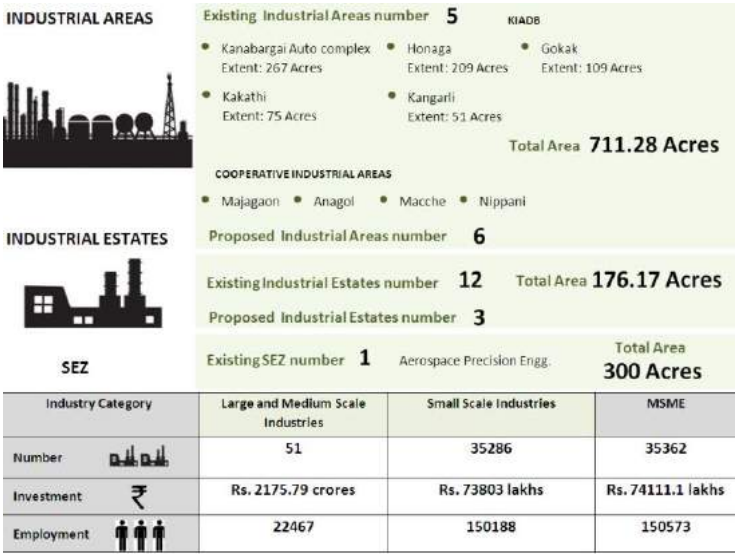
Table: State Wise Core Districts in BMEC

Sl No:	Core districts of Karnataka	Sl No:	Core Districts in Maharashtra
1	Gadag	**1**	Pune
2	Dharwad	**2**	Solapur
3	Ballari	**3**	Satara
4	Chitradurga	**4**	Sangli
5	Davanagere	**5**	Kolhapur
6	Haveri		
7	Bagalkot		
8	Koppal		
9	Belagavi		
10	Chikkamagaluru		
11	Hassan		

Out of the total 108 sub districts, 49 sub districts are distributed among the 5 core districts of Maharashtra and 59 sub districts among 11 core districts of Karnataka.

District Profiling: A detailed profiling of each of these selected core districts is carried out in this chapter of the report.The prime objective of the district profiling is to understand the District's resources & parameters which would support industrial &economic development of the region & also to understand the Gaps & issues which needs to be enhanced to promote development. Each profile consists of major highlights of the districts pertaining to demographic, economic and industrial sectors. The availability of resources, land banks and other potentials of the respective core districts are also highlighted. The profiling sections for each parameter are summarized below.

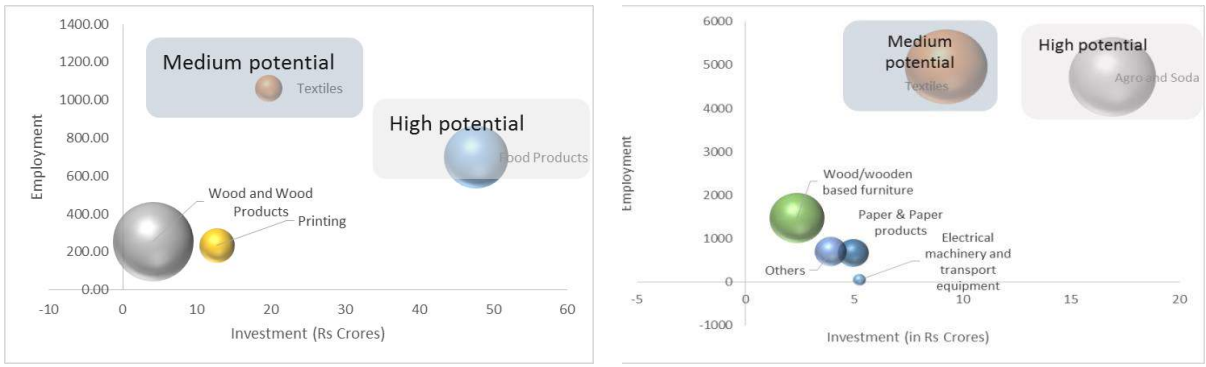
- **Demographic Highlights:** Indicating the basic demographic parameters like population, growth rate, sex ratio, literacy rate, density etc.
- **Land Utilization**: The area under forests, agricultural land, and other land uses are highlighted in the section.
- **Major Urban Centers**: This section briefs the Major urban centers having any economic /industrial potential in the respective district.
- **Economic Highlights**: The major economic parameters like GDDP, sectoral share of GDDP, growth of GDDP, sector wise employment etc are briefed here.
- **Industrial Scenario:** This section highlights the number and land area of industrial areas and estates and also summarizes the number, employment and investment of industries in the district. The details are summarized for each district as shown in the following sample of Gadag district.



Industry Category	Large and Medium Scale Industries	Small Scale Industries	MSME
Number	51	35286	35362
Investment	Rs. 2175.79 crores	Rs. 73803 lakhs	Rs. 74111.1 lakhs
Employment	22467	150188	150573

The other major industrial developments and a brief industrial sector analysis are also carried out in this section as shown in sample below.

Figure: Category Wise ASI and MSME Industries in Gadag



- **District Resources**: The resources available in the district including agricultural, human, mineral, and other non-renewable resources are captured in the section.
- **Infrastructure Facilities:** A snapshot of the road, rail, ports and airports in the district or in proximity to the district is highlighted here. A sample of Gadag district is shown below.

- **Potential for industrial development**: Each profile summarizes the potential for industrial development in the district including the land bank available, location, resource, infrastructure potentials etc.

The above illustrated profiling is carried out for all the 16 core districts of the corridor region and the same is elaborated as part of the main report.

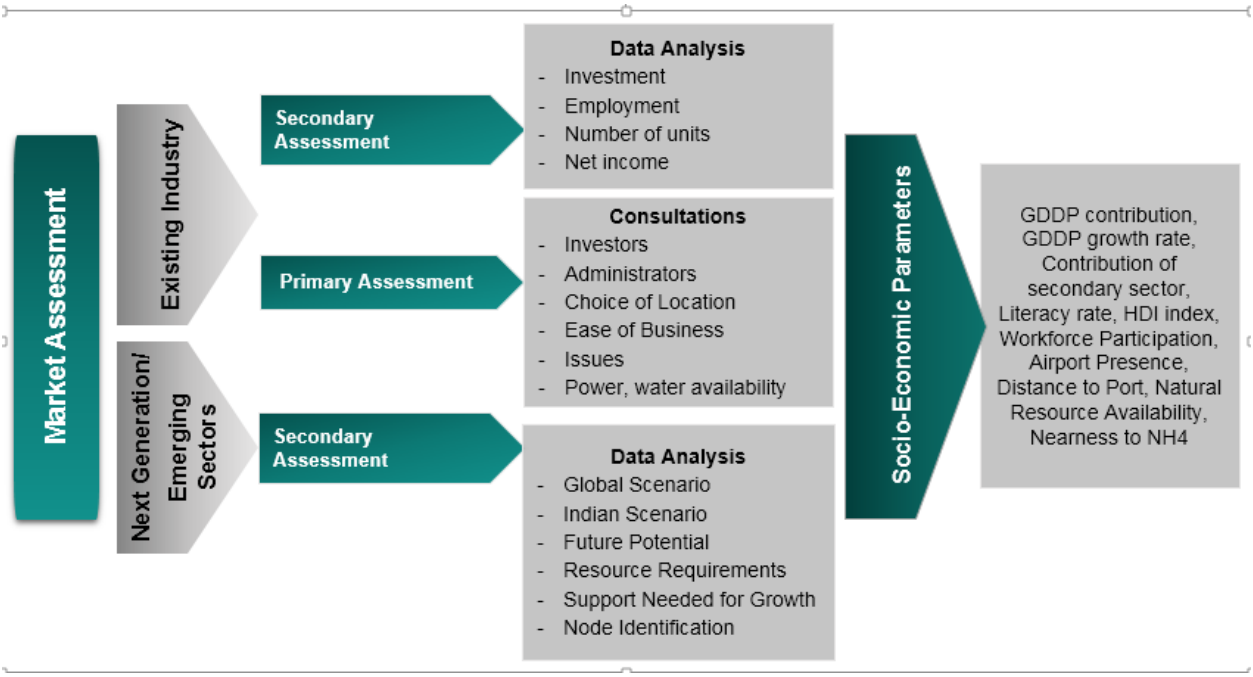
7. Market Assessment to Identify Target Industrial Sectors for BMEC region

7.1 Summary of Market Assessment and Identified Sectors

A comprehensive market assessment exercise has been undertaken to ascertain industrial development in the regionA comprehensive assessment of primary and secondary information is conducted for identifying key industries that would lead the development in the BMEC corridor.

7.2 Methodology adopted to assess the Target Sectors

Assessment of current potential industrial sectors: Districts falling in the BMEC corridor have been analyzed on socio-economic parameters to highlight the developed districts and districts which need developmental support. Each of the parameter has been evaluated and comparative scoring is done to arrive at strength of the districts. Each district falling under BMEC has been analyzed in terms of key parameters including investment, employment and number of units from MSME and Annual Survey of Industries (ASI) statistics. Districts have been analyzed in terms of different parameters including social, environmental and overall synergies to arrive at high, medium and low potential.



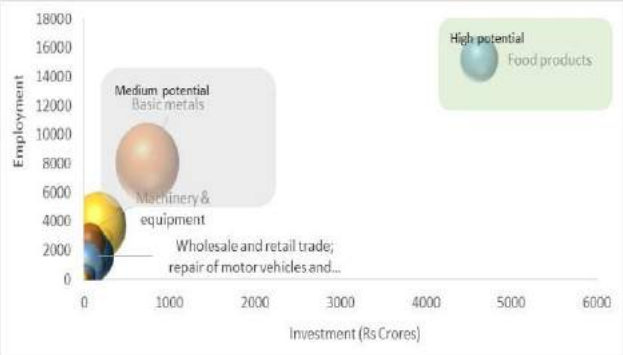
Assessment of emerging sectors:The corridor with a vision to stimulate invest climate will need focus on new/emerging sectors which have future growth potential. These emerging sectors will need government support and stimulus in terms of social infrastructure, connectivity/evacuation, marketing initiatives and policy interventions to induce private sector investments in the region.The

key strengths of district – physical and social infrastructure, resource availability, present industrial and development scenario are the key parameters for selecting emerging / potential sectors.

7.3 District analysis

Existing industrial sectors in each district is analysed under this section. Below given is an example of the Belagavi district.Agro processing, basic metals and textiles are major industries identified as per ASI in Belagavi while textiles and apparel is a major industry identified as per MSME. Using the current industry mix and likely emerging sectors in the district, sectoral mix has been devised.

Existing industries as per ASI



Sector	% Share
Agro Processing	15%
Heavy Engineering	10%
Engineering	10%
Auto and engineering ancillary	10%
Textiles	10%
Basic Metals	10%
Cement	10%
Advanced manufacturing	10%
Aerospace and Defense	10%
Others	5%

Further development of existing industries

Focus on next generation sectors

Source: ASI 2009-10

BMEC corridor is expected to leverage the existing industrial strengths and build on attracting the next generation sectors as per district strengths. Existing industries in Belagavi including agro processing, engineering, textiles, basic metals etc can be further developed along with **new sectors including aerospace and defence, advanced manufacturing and biotechnology.** As per the Karnataka Aerospace Policy (2013-2018), aerospace manufacturing cluster is expected to be built in the district. Cement industrial zone is also proposed in the district as a result of limestone availability. Biotechnology zone is also proposed to be established in the district. This level of analysis has been undertaken for each district to identify the best sectoral mix per district.

7.4 Market Assessment to identifyPotential Industrial Sectors across the region

The below mentioned table summarizes the existing potential industries and emerging industries that would drive the economic development in the corridor region.

Table: District wise potential and emerging sectors in BMEC states

	Chitradurga	Davanagere	Haveri	Dharwad	Belagavi	Ballari	Gadag	Koppal	Bagalkot	Hassan	Chikkamagaluru	Kolhapur-Sangli	Satara	Solapur	Pune
Advanced Robotics															✔
Aerospace and Defense	✔	✔		✔	✔										

Advanced Manufacturing				✔	✔										
Agro/Food processing	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
Auto and Engineering Ancillary				✔	✔	✔									✔
Basic metals	✔	✔	✔		✔	✔	✔	✔	✔		✔	✔	✔		
Biometrics												✔			
Cement	✔			✔	✔				✔	✔				✔	
Electronics										✔					✔
Gas based industries							✔	✔							
Engineering				✔	✔							✔	✔		
Heavy Engineering				✔	✔	✔		✔			✔				✔
IT / Biotechnology				✔	✔			✔							
Life Sciences															
Logistics services			✔										✔		
Medical Equipment															✔
Nanotechnology															
Nutraceuticals		✔	✔					✔		✔			✔		
Paper & Paper products			✔												
Pharmaceutical	✔									✔					✔
Solar PV								✔					✔	✔	
Space	✔									✔					
Textile	✔	✔	✔		✔	✔	✔		✔	✔	✔	✔	✔	✔	
Technical Textile		✔	✔			✔	✔		✔	✔				✔	
3D Printing	✔			✔											✔

The sectoral mix for BMEC districts has been devised in terms of advantages offered, issues faced and developmental opportunities for existing industrial establishments and new industries. Intensive primary interactions were undertaken to understand the socio-economic and industrial scenario of the district along with secondary sources of information including MSME district profiles and other published documents. Existing industrial infrastructure in the districts as per the Annual Survey of Industries (ASI) published by Directorate of Economics & Statistics, Government of Karnataka (November 2013) and micro and small industries (MSI) data published by District Perspective Plans is also studied. For each respective district, investment, employment and number of operational units are analysed sector wise to understand sector potential. Similar analysis is undertaken for MSI to understand support infrastructure for major industries in district and evaluate potential for cluster development. High and medium sectors across ASI and MSI are analysed across socio-economic parameters to arrive at overall attractiveness for districts.

Following set of industries, top five current and emerging sectors will play an important role in BMEC corridor development with these top 10 sectors contributing more than 50% in incremental employment generation and accounting for more than 45% of projected investments in 2040-41.

Engineering	Automobiles	Textiles including Apparels	Agro/Food Processing	Base Metals
Robotics	Medical Equipments	Nutraceuticals	Technical Textiles	Aerospace, Defence and Space

7.5 Emerging industrial Sectors which can be accommodated in BMEC region

Through several secondary sources of information and primary interactions, the sectors which have potential for future economic growth have been analysed in terms of global outlook, Indian scenario and advantages which these sectors may offer going forward.

Sector	Global Scenario	Potential-India	Suitable Districts
Aerospace and Defence	Expected to grow from US $380.36 billion in 2009 to US $515 billion in 2020	• Indian market expected to reach US $150 billion by 2019 • Drivers include liberalized FDI policy upto 49% in defence and 100% private investment allowed in aerospace	**Chitradurga**: Proposed ISRO, DRDO, BARC establishments **Dharwad and Belagavi**: Proposed Aerospace Parks **Davanagere**: Proposed Aeronautical University and flying training school
Nutraceuticals	Expected to reach US $ 250 billion in 2018 from US $ 142.1 billion in 2011	• Indian market is expected to grow at a CAGR of 13% to reach US $ 2.7 billion in 2016 from US $ 1.5 billion in 2011 • Drivers include increasing health consciousness among youth	**Davanagere, Haveri and Koppal**: Strong agro base **Hassan**:Pharmaceutical SEZ **Satara**:Food processing base
Space Industry	Recorded revenues of US $304.31 billion in 2012	• Planned outlay of around US $6.6 billion in the 12th five year plan • Driver includes increasing interest of private players in the satellite business	**Chitradurga**: Proposed establishment by DRDO and ISRO. **Hassan:**Presence of Master Control Facility of ISRO
Technical Textile	Expected to grow from US $133.93 billion in 2012 to US $160.38 billion in 2018	• Expected to grow from US $13 billion in 2011 to US $36 billion by 2016-17 • Driver include booming infrastructure sector	**Haveri and Davanagere**: Presence of textile players, proximity to Dharwad (auto industry) **Gadag, Bagalkot, Ballari and Hassan**: Existing textile clusters **Solapur**: Textile base
Solar PV	Annual PV capacity to go up from 17,064 MW in 2010 to	• Target of 20GW energy generation by 2022 from the current 1.7GW capacity as of 2014 • Drivers include shortfall of	**Satara, Solapur and Koppal**: Solar power generation potential

	84,240 MW in 2017	installed solar capacity with respect to the demand and government aim of transforming India into a solar hub	
Advanced Robotics	Expected to grow upto US $1.7-4.5 trillion by 2025	• Indian market expected to reach US $100-200 billion by 2025 • Drivers include reduced time and labor cost and increased productivity	**Pune**: High literacy rate and auto cluster presence
Biometrics	Expected to grow from US $8.3 billion in 2013 to US $27.5 billion in 2019	• Valued at US $50 million in 2011 and expected to reach US $359 million by 2016 • Drivers are Government adaptation of biometrics	**Kolhapur-Sangli:** Literacy rate and presence of educational institutions
Medical Equipment	Expected to grow from US $212 billion in 2011 to US $302 billion in 2017	• Valued at US$ 5 billion and expected to grow to around US$ 7.8 billion by 2016 • Drivers include increased public spending	**Pune:** High literacy rate, presence of biotech firms and proximity to JNPT

7.6 Key parameters required to promote identified Target Sectors

The keys parameters required to promote the target sectors are listed below.

Industry	Industrial Infrastructure
Aerospace and defence and space	High skill set availability through ITIs/ITCs and engineering colleges; proximity to raw material sources; financing support for entrepreneurs; warehouse development for raw material storage; dedicated port connectivity; availability of larger land parcel; research and development support; cluster development approach to promote synergies between industrial units
Biometrics	High skill set availability through educational institutions, port connectivity ; nearness to user markets through dedicated rail/road support; research and development support through industry collaboration
Nutraceuticals	Proximity to ports through rail/road; provision for stuffing/destuffing at factory sites; presence of CETPs; nearness to raw material sources ; strong logistics support to cater to domestic end user markets; dedicated policy support; road shows to promote sector
Solar PV cells	Proximity to solar power plants; moderate skill set availability; government support with dedicated sectoral policy; financing support for entrepreneurs; road shows for sector promotion

Technical Textile	Presence of CETPs; high skill set availability through ITIs/ITCs; financing support for entrepreneurs; enhanced port connectivity; cluster development to support synergies; proximity to end user industries
Advanced Robotics	High skill set availability with presence of educational institutions; dedicated port connectivity to support import of raw materials; cluster development for raw material support; financing support for entrepreneurs; proximity to end user markets including automotive; road shows to promote sector
Medical Equipment	Port proximity, high skill set availability, nearness to biotechnology industries, research and development support with university collaboration

7.7 Identification of Green Industries, Green Industrial Sectors & Green Product Manufacturing Industries

The vision of BMEC involves use of clean energy and reduction of emissions. As part of the BMEC corridor, certain emerging and next generation sectors have been identified which will thrive on sustainable living and clean energy concepts. Sectors such as biotechnology, nanotechnology, renewable energy, 3D printing, robotics, biometrics and education sectors are expected to play an important role in BMEC region development going forward. Biotechnology and nanotechnology units will focus on service delivery with a cap on the harmful emission generated. Moreover, 3D printing centers will act as service providers for manufacturing establishments which can curtail on production of parts thereby limiting the emissions generated by units.

Also, with the Dabhol gas pipeline passing through several BMEC districts, all industries are expected to benefit from the usage of clean fuel. Any kind of industry which requires fuel can use clean energyfrom Dabhol gas pipeline including automobiles, ceramics etc. Moreover, new industries including ceramics, ice cold storage, plastics, fertilizers etc can be established in districts falling under the influence area of the pipeline. Gas-based power plants can be established along the pipeline to cater to energy requirements of the industrial users. Fertilizer units can be established along the pipeline region where natural gas acts as an important feedstock. Moreover, districts including Chitradurga, Davanagere, Belagavi, Satara and Sangli have wind power potential with wind power projects already operational in the districts. Wind projects along with solar energy can be harnessed in the corridor development region to cater to energy requirements of the industries.

Overall, green industries including services sector are expected to account for 23% of total investment in BMEC region, 18% of industrial units and 13% of the industrial turnover in 2040-41. Green industries along with services sector will have an optimum land requirement and expected to account for 4% of land in overall BMEC region. These industries will not have high employment intensity while catering to only 2% of the overall employment in the region. Industries which are considered as green for this analysis includes biotechnology, solar PV, robotics, biometrics and gas-based industries.

8. Estimation of Economic and Industrial Growth in BMEC Region

8.1 BAU and BIS Scenarios to estimate Economic & Industrial growth, BMEC region

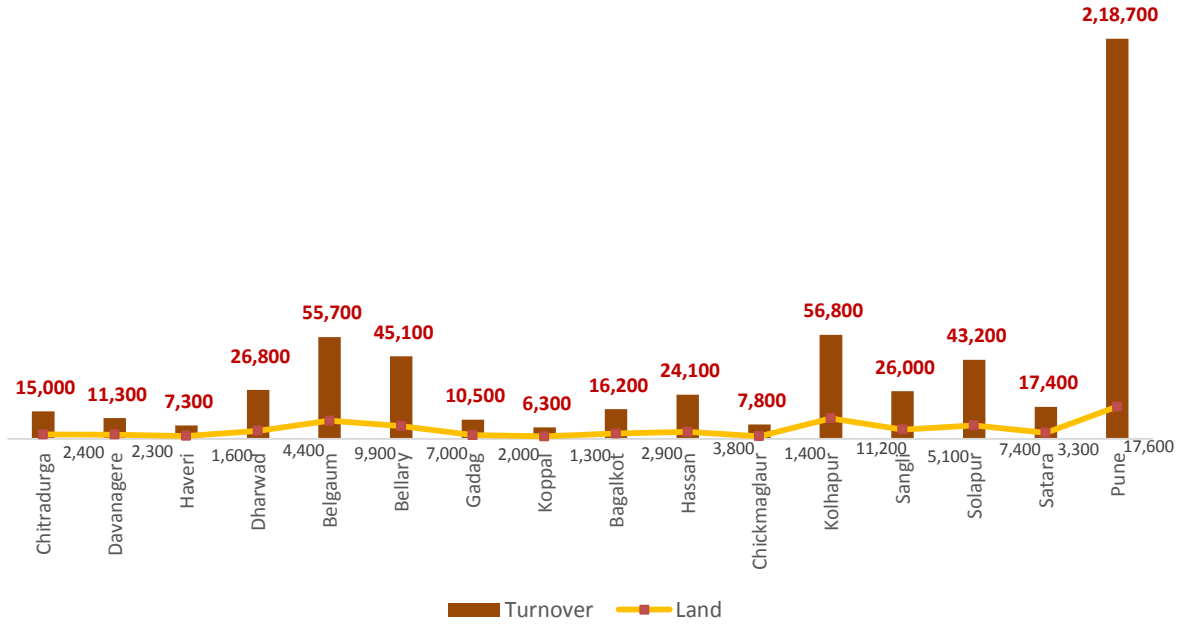
BMEC corridor is expected to play an important role in improving the secondary and tertiary sector GDPs of the two states. With the development of industrial nodes and requirement eco-system of infrastructure development, secondary and tertiary sector contribution of BMEC region is expected to increase from 64% in 2011-12 to 71% in 2040-41 to Karnataka and Maharashtra secondary and tertiary product.

Overall the corridor will focus on balanced growth which will leverage industrial advantages of well-established districts and develop less-developed districts to full potential. Districts such as Chitradurga, Haveri, Gadag, Koppal, Satara, Solapur and Sangli are expected to witness increased focus and infrastructure development to develop world-class manufacturing and services enabled environment.

8.2 Summary of Industrial and Economic Growth Estimates of the Region

8.2.1 Land requirement for Industrial development

Figure: Summary of turnover and land requirements in BMEC Core districts in 2040-41



Source: CRIS analysis

Overall, BMEC districts are expected to generate turnover of US$588,000 million with a total land requirement of approximately 83,600 hectares. Pune district, which is the major industrial centre in the corridor, is expected to account for largest turnover among the districts and correspondingly require major land area. Pune will serve as an important centre of growth with turnover generation of approximately US$218,700 million in 2040-41 followed by Kolhapur and Belagavi generating turnover of US$56,800 million and US$55,700 million respectively.

8.2.2 Employment generation

BMEC region is expected to account for about 55 million employment opportunities by 2040-41 out of which 31 million employment generated as a result of business as usual scenario.It is expected that corridor led development initiatives will lead to generation of 23.3 million[6] incremental employment opportunities. Pune and Kolhapur districts will be major employment generators in Maharashtra while Belagavi, Ballari and Hassan are expected to generator major employment in Karnataka.

Table: Employment projections

Description	BAU employment in 2040-41 (in million)*	BIS employment in 2040-41 (in million)	Total Employment in 2040-41 (in million)
Karnataka BMEC districts	18.4	9.1	27.5
Maharashtra BMEC districts	13.0	14.1	27.1
Overall BMEC region	31.4	23.3	54.7

** BAU employment is project using Census 2011 main workers data for districts*

Source: CRISIL analysis

8.2.3 Exports

The core districts of the BMEC corridor is expected to generate exports of US$ 82,000 million in 2040-41.

8.2.4 Projected Investments

Industrial development in BMEC region will require investments to the tune of US$ 114,500 million by 2040-41 which will be led by Pune with an investment requirement of US$ 33,900 million and Belagavi with an investment requirement of US$ 12,100 million. Agro processing emerges as the leading sector attracting investments of more than US$ 15,000 million.

8.2.5 Value of Output

BMEC corridor is expected to generate turnover of US$ 588,000 million. Pune will serve as an important centre of growth with turnover generation of approximately US$ 218,700 million in 2040-41 followed by Kolhapur and Belagavi generating turnover of approximately US$ 56,800 million and US$ 55,700 million respectively.

[6] Initial employment generations indicated in Interim Draft Report of BEMC perspective Plan, which is 33.7 Million (incremental employment component) in BMEC core districts, can be considered as optimistic scenario. Incremental employment of 23.3 million is assumed to more realistic projection.

9. Estimation of Population Growth

Population forecasting is an essential component for comprehensive planning which helps us in determining the needs for land, investments, infrastructure, etc. for the horizon period. Different scenarios were developed based on conventional approach and specific targets outlined in the project vision.

9.1 Summary of Population Projections for BMEC Region

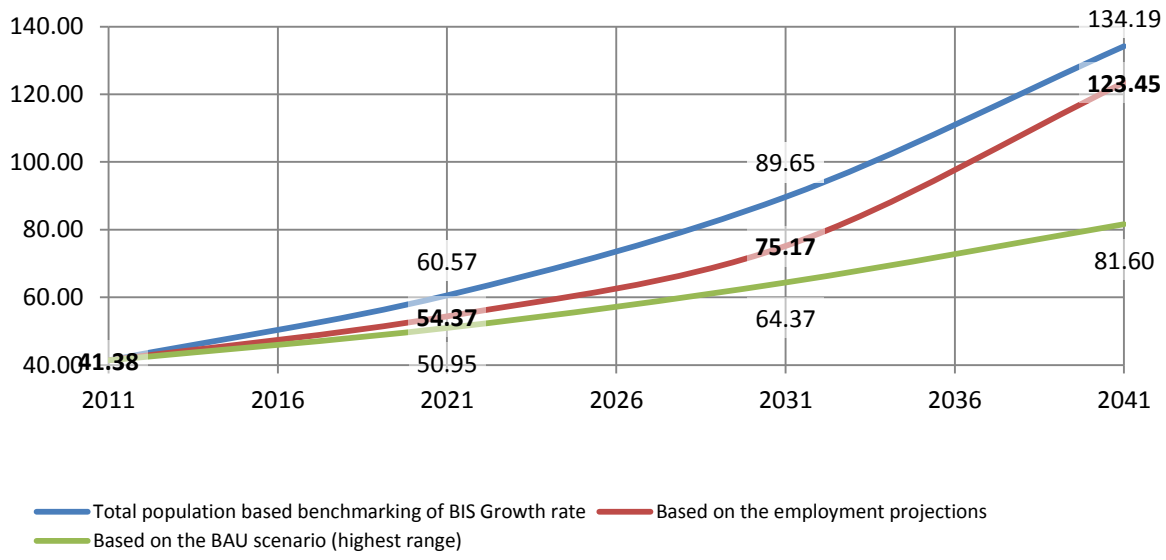
The population projected for the entire BMEC & core region for the year 2041 based on the three approaches are given in the following table:

Table: Projected Population for 2041 in BMEC Region

Scenario	BMEC Region 2041	BMEC Core Region 2041
Business as Usual (BAU)	173 million	82 million
Business Induced Scenario (Benchmarking based)	227 million	134 million
Business Induced Scenario (Employment based)	**216 million**	**123 million**

Source: Crisil, Egis

Figure: Population projected for core region – various scenarios



Source: Census of India, Crisil, Egis

Development scenario based on employment projections has been considered further for the sector level demand estimations and formulation of strategies. The table below shows the **population projected** for the Core BMEC region under Maharashtra and Karnataka separately as well as for the entire BMEC region till 2041.

Table:Business Induced Population Projection– Region wise split (2011-2041)

Region	2011	2021	2031	2041
		figures in million		
Core Region- Karnataka	19.3	28	40	65
Core region- Maharashtra	22	27	35	59
Core region of BMEC	41.3	55	75	124
Bangalore and other CBIC overlap	15.1	22	26	29
Mumbai and other DMIC overlap	23.4	32	45	64
Rest of BMEC	38.5	54.5	71	93
Total BMEC region	79.8	109.5	146	217

Source: Census of India 1991, 2001, 2011, Crisil, Egis

9.2 Population-Current Growth Dynamics of BMEC Region

The total population of the BMEC region as per the Census of 2011, is **79.8 million** (79,823,438) compared to the total population of the region in 2001 which was 67.3 million (67,282,595). In absolute terms, the population of the region has increased by about 12.5 million over a decade.

Table: BMEC Region- Population Profile

Census Year	Population of BMEC Region	Decadal Change	Growth Rate (%)
1991	54,072,918		
2001	67,282,595	13,209,677	24.43%
2011	79,823,438	125,40,843	18.64%

Source: Census of India 1991, 2001, 2011

Given below is the consolidated population share of Karnataka and Maharashtra in the BMEC region and the core region.

Table: Population share of BMEC states in Corridor and core region

State	Population in millions – BMEC	Population in millions – Core Region
Karnataka	34.46 (43%)	19.34 (47%)
Maharashtra	45.4 (57%)	22 (53%)
Total	79.8 (100%)	41.34 (100%)

Source: Census of India 2011, Egis

In both the cases i.e. The entire BMEC region and the core region exclusive, Maharshtra has a higher share of population. While the Decadal population growth rate of India for the period of 2001 to 2011 is 17.7% that of BMEC region is at a rate of **18.64%**. This clearly indicates that the region is growing at a rate higher than that of the nation. However, when compared with the decadal growth rate of population within the BMEC region for 1991-2001 (24.43%), it is seen that the region is having a declined growth rate. This essentially follows the trend of the nation which has also decelerated from a higher rate of 21.34% in 1991-2001 to 17.7% (2001-2011). The overall decadal growth rate of the core region is about 15.59%. The average decadal growth rate of only the core districts in Karnataka is about 12.48% where as that of Maharashtra is 18.46%.

Urbanization Status in Core Region of BMEC:

There were about 134 urban areas in 1991 which increased to 156 in 2001 with an addition of 22 newly formed urban areas to the urban areas in 1991. The total number of urban areas in 2011 is 202 which were formed with an addition of 46 newly formed urban areas to the existing urban areas of 2001. The table below shows increase in the number of urban areas with respect to its previous decade.

Table: Increase in urban areas from 1991-2011, BMEC core region

	1991		2001		2011
	Total	Newly added	Total	Newly added	Total
Karnataka	81	*8*	89	*17*	106
Maharashtra	53	*14*	67	*29*	96
BMEC Core	134	*22*	156	*46*	202

Source: Town directory historical statistics- Census of India 2001, Census of India 2011

The table given below shows the class wise distribution of urban areas in 2001 and 2011.

Table: Class wise distribution of urban areas in 2001-2011, BMEC core region

Core region	Class I	Class II	Class III	Class IV	Class V	Class VI	Total
Karnataka	11	12	42	26	12	3	106
Maharashtra	8	9	37	28	11	3	96
Total	19	21	79	54	23	6	202
Share in total urban population	***68.71%***	***8.82%***	***15.95%***	***5.29%***	***1.09%***	***0.13%***	***100.00%***

Source: Town directory historical statistics- Census of India 2001, Census of India 2011

Note: The class wise distribution of 2001 is directly from the class distribution of town directory- census of India 2001 and that of 2011 is a derivative based on the population as given in PCA, Census of India 2011. Categorisation of the various classes and subsequent population as per Census of India 2011 is given below:

Size-class	*Population*	*Size-class*	*Population*
I	*1 Lakh and above*	*IV*	*10,000 to 19,999*
II	*50,000 to 99,999*	*V*	*5,000 to 9,999*
III	*20,000 to 49,999*	*VI*	*Less than 5,000*

9.3 Population Projections for the Region

Population projections for the region are approached in three (3) different scenarios. They are:

- **Business as Usual Scenario (BAU):** Assuming that the population would grow following the normal growth trends, the population to be accommodated in the BMEC region is projected for a period till 2041. The BAU population for the BMEC region is calculated by individually projecting the District-wise using various projection systems. BMEC core region has 202 urban settlements accounting for population of about 15.5 million and 69% of this population resides in 19 Class I urban centres. Base line population projections for these urban settlements were arrived based on the assumption that these entities will grow exponentially without any major external intervention. Newly emerging urban areas could not be included in this approach but will have less impact in overall scenario.
- **Population Projection based on Benchmarking of BIS growth Rate:** Assuming that the population would grow at a higher rate than the normal in an induced economic scenario, the population to be accommodated in the BMEC region in a period up

till 2041 is projected. Various trends and benchmarks derived throughcase studies ofnational and international exampleswereanalysed in order to arrive at a compounded annual growth rate at which the region might grow over the period of 25 years is explained in detail in the section. Based on various case studies and factoring pipeline sectoral infrastructure projects & investments, constant district level CAGR were assigned for the next three decades. **Average CAGR as per this approach is 3.31**. Further, based on projected urban share ratio, district wise urban population was estimated.

- **Population Based on the Employment Projections:** Employment projections based on Market assessment and demand based estaimted Economic and Industrial growth ofBMEC region indicates, that the core BMEC districts will generate a**n additional 23.3 million (42.6%) employment opportunities by 2041**. With this additional BIS employment due to BMEC,which will be over and above the employment of 31.5 million estimated for BAU growth the total employment of the Region would be around 55 million by 2041.The additional employment projections include both direct & indirect employment and represent formal sector employment for main workers.The total population in the core district is assumed to be the sum of induced population due to additional employment and population projections based on BAU employment growth in the core BMEC Region. Based on projected urban share ratio, district wise urban population were estimated for BAU employment based population. However, the additional employment projections were estimated to be in manufacturing and services sector which indicates 46 million additional population which needsto be accommodated in both Greenfield & Brownfield urban nodes in BMEC Region.

Given below is the summary of the 2041's total population projected for BMEC core region, and itssubsequent urban and rural shares achieved through various approaches explained above.

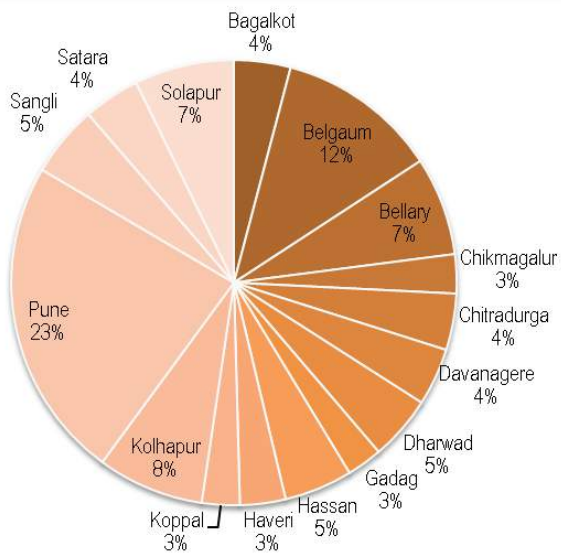
Table: Summary of the population projections dervided through various scenarios

Population projections scenarios	Estimated Total Population, 2041 (in Millions)		
	BMEC core region	Urban	Rural
BAU	82	39.1	42.9
BIS, with trends and benchmarks	134	72.5	61.69
Employment based projections	**123.45**	**79.6**	**43.85**

Source: Census of India, Crisil, Egis

BMEC region is expected to have industrial & infrastructure development to meet the estimated market demand and this development is expectedto attract investment, create jobs and enhance the economy of the Region. Considering the above-mentioned fact, both the above-mentioned induced scenarios can be considered to derive at the population of the region. The intention of planning of the BMEC region is also to impart growth in less / under developed districts of the region which will result in their better social index, economic escalation and overall development. This is achievable by inducing additional employment in these districts in comparison with their normal trends. When the district-wise share of the population through employment based projections and the benchmarking methods are evaluated, it is understood that the employment projection method is more judicious in inducing growth in less / under developed districts. Further, this projections system can be considered more logical, as it is directly linked to the estimated growth paramters & projected industrial demand. **Thus the population projection of 123.45 million, based on the employment estimates, is considered for the Business Induced scenario of population forecasting of BMEC**.

Figure: District wise share of BIS projected population of BMEC Core region



The district-wise share in the projected population as per BIS for 2041 is as illustrated in the diagram given. It is clear from the diagram, Pune has the highest share of population of about 23% of the total projected followed by Belagavi (12%) and Kolhapur (8%). The least share is for Gadag & Chikkamagaluru districts (3%).

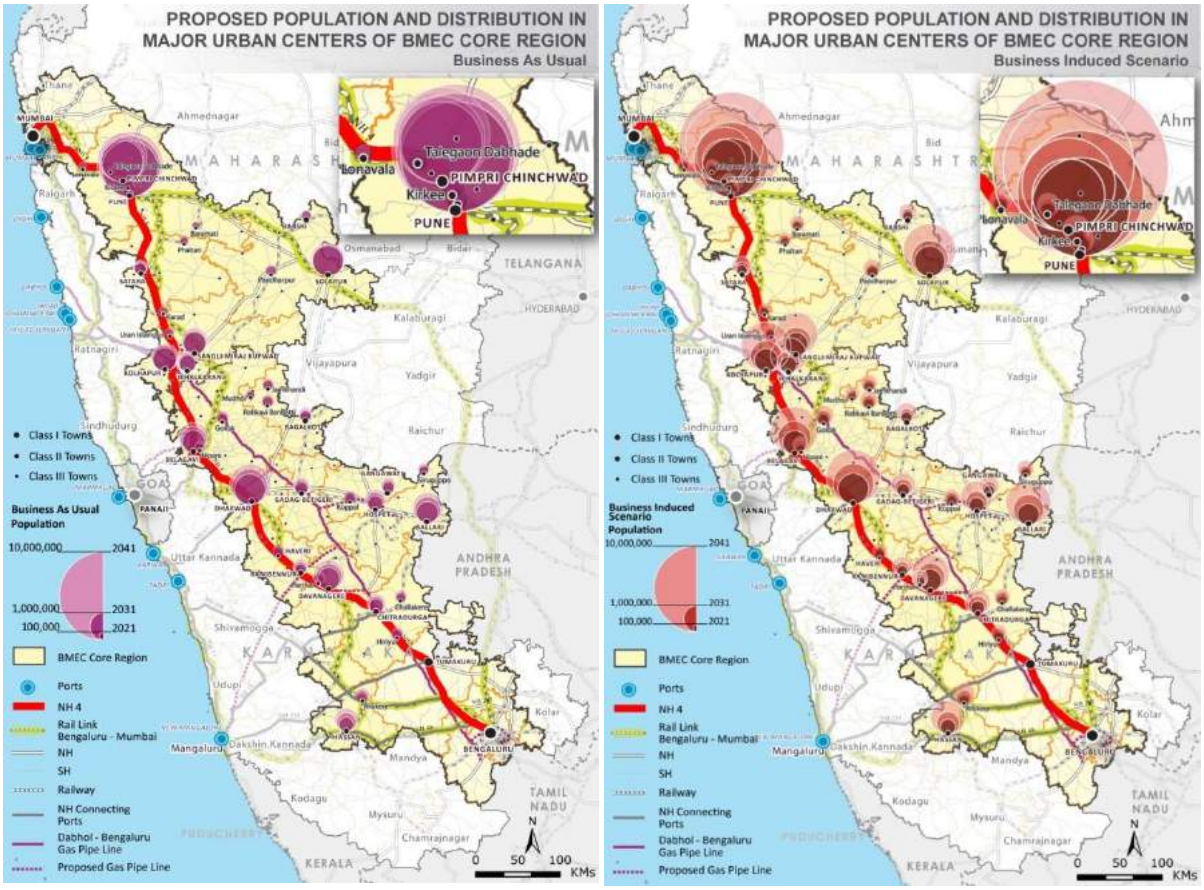
9.4 Need for Greenfield Urban Centres / Nodes

The population projected for the BMEC region indicates that in the business induced scenario, the population almost triplesfrom the 2011 population (82 million in absolute terms). This increase in population due additional employment will trigger an inducedurbanization process within the region. To cater to the needs & demands of such induced scenario and in order to promote an organised &planned growth within the region, there is a need to plan the distribution of this population across the regionthrough development of Greenfield urban centers/ megacities along with the planned Industrial nodes and in the existing urban centers through Brownfield developments.As per the existing status, the average density of BMEC region as per Census 2011 is about 556 persons per square km or about 6 persons per hectare (pph).Based on benchmarking of densities for various mega cities and Greenfield urban centerss, **a density of about 100 persons per hectare is assumed as ideal for a sustainable city development.The current urban population of the BMEC Core region as per census 2011 is 58.62%** which is much **higher than the national level urban population share of 31.8%.** This clearly indicates that the BMEC region is already having comparatively a rapid pace of urbanization and growth. The urban share of population of the Region whichwithinKarnataka is currently 46.16% and that of Maharashtra is 68.20 %. Out of the total 58.62% of total urban population in the BMEC corridor, about 65.76% is Maharashtra's share which is predominnetly due to Pune district and its proximity to Mumbai region.

Projections suggest that India will have more than 700 million urban populations by the 2040, which indicates the growth of urban share to be around 50% from current 31.2%. As we compare the current urbanization trend of the region and the projections on urbanization in India by Planning Commission, and for Karnataka and Maharashtra by various other secondary sources, it is understood that the states of Karnataka and Maharashtra areexpectedto grow at a much higher rate. The urban population share in2011 for BMEC core region is about 37.5% of the total core population which is estimated to grow to 64.5% by 2041. Business as usual growth scenario indicates that BMEC core region will account for increase in urban population of about 17.8 million in addition to base year urban population. Business Induced growth scenario, increase in urban population is

estimated to be 64.1 million which indicates much higher growth rate of all urban centers in BMEC core region. The map provided below shows the extent of stress that will be exerted in the existing urban centers in the absence of Greenfield urban centers / Megacities. To ease the pressure on existing urban centres, the required number of Greenfield nodes that need to be developed as a result induced growth scenario is computed in the next section.

Map: Projected Population Distribution in Urban Centres, BMEC Region (BAU and BIS Scenario)



Source: Egis

9.4.1 Share of Urban Population & Number of Greenfield Urban Nodes

Scenarios to arrive at number of Greenfield urban centers/ megacities required to accommodate the projected population are based on thefollowing assumptions:

- Considering the fact that existing urban centers may not be able to cater to the entire additional urban population and also due to the fact that the proposed Industrial Nodes would be supported with allied urban infrastructure or Mega cities, it is assumed that only 33.35 million of urban population estimated under BAU (out of 79.6 million of the total estimated urban population) will be accommodated in the existing Urban Centers, which will also be developed as Brownfield cities. This forms around 42% of the estimated urban population.
- The ensuing urban population of 46.25 million, due to additional employment which is also the balance of the urban population, can be accommodated in the Greenfield urban center /Megacities which will be developed within & around the Industrial Nodes,which are envisioned as part of BMEC Perspective Plan.

- Based on various benchmarks, its assumed that the Greenfield urban centers/ Megacities will have an area of about 350-450[7]square km with an overall gross density of 100 people per hectare

To arrive at a range on the number of Greenfield urban centers/ Mega cities, the following two (2) scenarios were worked which are as follows.

Scenario 1: Considering the population projected based on district-wise benchmarking-BIS

Scenario 2: Considering the population projected based on the employment projections

As per the above mentioned scenariosand assumptions, the total number of Greenfield urban centers / megacities required and its total area requirement by the end of 2041 for the entire BMEC region and for the respective BMEC Statesis as given below:

Table: Estimation of Number of Greenfield Urban Centers/ Megacities (2041): BMEC Region

Total Urban Population of BMEC Core region (in million)	Population to be accommodated in Greenfield Urban Centers/ Mega cities (in millions)	Greenfield Urban Centers/ Mega cities	total area required for Greenfield mega cities
79.60	39.15- 46.25	9-13	3915-4625 km^2

Source: Egis

Table: Estimation of Number of Greenfield Urban Centers/ Megacities (2041): State wise share

BMEC States with total Urban population(in million)	Population to be accommodated in Greenfield Urban Centers/ Mega cities (in millions)	Greenfield Urban Centers/ Mega cities	total area required for Greenfield mega cities
Maharashtra (45.87)	28.92	6-8	2892 km^2
Karnataka (33.74)	17.32	4-5	1732 km^2

Source: Egis

The above-mentioned estimated number of Greenfield mega cities is based on projected population and does not indicate the number of Greenfield Industrial Nodes. This projection facilitates to understand the need for Greenfield urban developments, kind of urban development this region is expected to face in the next 25 years, the area required for urban development And with 42% of the projected urban population expected be accomodated in the existing urban centers, the need to enhance thse urabn centers through Brownfield urban developments is also emphasised.

[7] Referring Navi Mumbai, GPCPIR, Gurgaon Manesar, Pithampur – Dhar – Mhow IR - models

10. Location Suitability Assessment of the Corridor Region for Identification of Nodes/Mega cities

10.1 Introduction

Identification of suitable location for developing Nodes / Mega Cities across the Region is one of the prime objectives of this Perspective Plan and the same is carried out through in this section of the Report. The recommendation on the location of these potential Nodes / Mega cities within the delineated corridor region will be prioritised based on the areas which have geographical advantages along with availability of physical infrastructure and potentials. In this regard, based on the inputs from district profile assessment discussed in the previous chapter, a detailed scientific assessment of the BMEC corridor region is carried out considering various parameters and a **"Location Suitability Assessment"** was carried out through a "**Suitability Matrix**". The Suitability Matrix is a process of weightage based comparative assessment of various parameters considered for the assessment in order to determine the suitable location of potential nodes. Based on the analysis, the possible potential nodes identified are also classified in to different grades based on their potential & prominence for development.

The prime objectives of the assessment are as given below:

- **To analyse the BMEC region through a Scientific GIS based methodology to identify best suitable areas/ districts for Industrial Development.**
- **Recommend the best suitable locations within the BMEC for developing the potential Nodes/ Mega Cities within the delineated corridor region.**

10.2 Location Suitability Assessment

The delineated BMEC region would be assessed for its suitability & capability to accommodate Industrial Nodes / Mega Cities, which are proposed to be developed as Global Manufacturing Destinations. This would be carried through assessing the region under each parameter which favours & does not favour industrial development. The comprehensive output would be assessed by prioritising most significant parameters which favour Industrial development by providing higher weightages.

Each of the sub-parameters identified under various sectors / Main Parameters, would be mapped for the entire region (based on data availability) and analysed to identify the most favourable / suitable location within the region. The locations which emerge most favourable among majority of the sub-parameters, excluding the least favourable sub-parameters like environment & heritage etc., through negative scoring, will be identified as the most suitable location for developing industrial nodes. The suitability would be carried out for both districts & sub districts based on the scale of data available under each parameter & its sub-parameters.

GIS Mapping, Colour coding & Grading: The most favourable location /district / sub-district under each sub-parameter would be identified and assigned with a colour coding & grading representing

the intensity of favourable parameters / sub-parameters. i.e., A colour range of dark to light is assigned to each of the parameters, with darkest colour representing the most favourable locations. Based on this colour code based GIS mapping & assessment a set of top three locations within each sub-parameter will be identified, Graded between 1 to 3, with Grade 1 representing the best suitable district/ sub- district.

Further, the comparative assessment of each district's suitability for locating the node under each Sector / Parameter / Sub-Parameter is illustrated graphically through **Radar Graph Analysis** as part the Location Suitability Assessment.

Suitability Matrix: In order to carry out an integrated comparative assessment of all the parameters / sub parameters for all the districts, the assessment would be carried out through a Suitability Matrix which will have weightage based scoring for each district for each parameter / sub parameter and the same is explained in the next section.

10.3 Parameters Considered for Location Suitability Assessment

Various parameters such as **Land use/ land utilization , Environmental Parameters, Demographic indicators, Socio-economic parameters, Industrial Scenario, Infrastructure components like Transport, Water, Power, Port Infrastructure, Airports, Assessment of Land Availability etc.** were assessed in order to identify a suitable locations for potential nodes. The main parameters are further categorised with sub-parameters and in total around 49 sub-parameters under 11 Main parameters are considered for assessment and the same is listed below:

Table: Parameters considered for Location Capability Assessmnet for Potential Nodes

	MAIN PARAMETERS CONSIDERED FOR ASSESSMENT	SUB PARAMETERS
1	Landuse/ Land Utilisation	Agriculture
		Forest
		Waste Lands
2	Environmental Parameters	Elevation & Slope
		Hydrology
		Geology, Minerals& Soils
3	Demographic Indicators	Population
		Decadal Growth Rate
		Population Density
		Share of Urban of Population
4	Socio Economic Parameters	**Social components***(WFRP, HDI, Literacy, Non Agriculture Work Force, Growth Rate of Non Agriculture Work Force & Educational/ Training Institutes)*
		Economic parameters*(GDDP, Growth rate of GDPP, Secondary Sector Contribution & Per Capita Income)*
5	Industrial Scenario	Presence of Existing Industrial Development
		Presence of Large Scale Industries

		Industrial Employment
		Proximity of Dabhol- Bengaluru Gas Pipelines
6	Transport Infrastructure	Road (Existing infrastructure, accessibility analysis and proposed links)
		Rail (Existing infrastructure, accessibility analysis and proposed links)
		Airport (Existing infrastructure, accessibility analysis and proposed links)
7	Proximity & Connectivity to Ports	Proximity to ports
		Existing Road & Rail linkages to ports
8	Water	Proximity to Major Water Sources
		Water availability & ground water status
9	Power	Installed Capacity of Conventional Power
		Installed Capacity of Renewable power
10	Land Acquisition status and Government Land Holdings	Assessment of KIADB's, MIDC Status of Land Acquisitions
		Assessment of Government Land Holdings
11	Others	Heritage

The parameters are analysed based on the level of availability of data. Independent Assessment of each of these sub-parameters were carried out as part of the **Location Suitability Assessment**& an integrated assessment of all the parameters **were carried out as part of the Suitability Assessment Matrix** for arriving at the final recommendations for the locations of potential nodes/ mega cities.

Figure: Flow chart showing the Methodology of Location Capability Assessment for identification of potential nodes

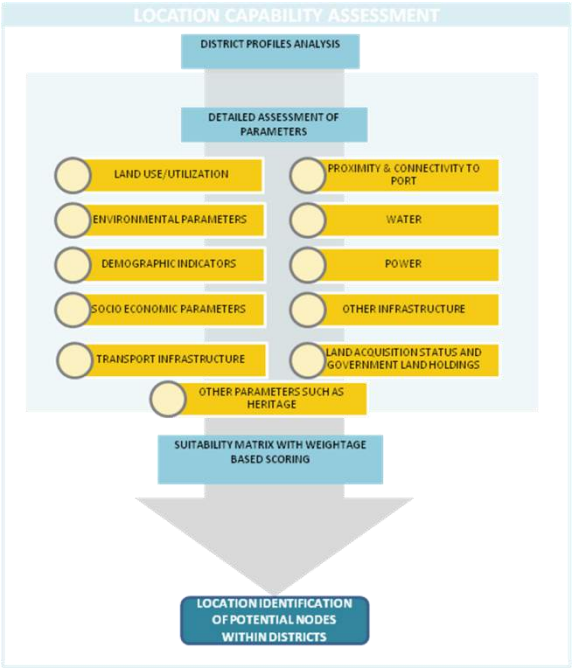


Table: State wise distribution of core districts and target sub districts, BMEC

State	No. of Core districts for assessment of nodes	No. of Target sub districts for assessment of nodes
Karnataka	11	59
Maharashtra	5	49
Total	**16**	**108**

Source: Egis

Out of the total 108 sub districts, 49 sub districts are distributed among the 5 core districts of Maharashtra and 59 sub districts among 11 core districts of Karnataka. These sub districts become **the target sub districts for analysis and identification of potential nodes/ Mega cities.**

10.3.1 Summary of Location Suitability Assessment:

The following table provides summary of the detailed location suitability assessment carried out for **11 parameters with 49 sub parameters.** The summary also provides details of the objective of each parameter, criteria considered for grading the suitability and the identified best suitable district/ Grade 1 districts under each sub- parameter**.** However the **detailed assessment explained in the main part of the report covers top 3 Grades of the suitable districts and also covers sub-district level suitability under each sub-parameter,** which is not covered in the following summary part.

Table: Summary Table of Location Suitability Assessment

Parameter	Sub parameter	Grading Criteria	Best Suitable Districts/ Grade 1
LAND USE ANALYSIS *Objective:* • ***Excluding fertile productive agriculture area from active Industrial development*** • ***Identifying districts with waste lands & least productive/single crop areas*** • ***Excluding Forest Covers, Protected areas & wild life habitat from Industrial development***	**Agriculture** (Double crop & agricultural Plantations)	Less than 25% of district area under double crop cultivation	**Chitradurga(24%),Gadga & Koppal in Karnataka and Solapur(13.14%), Satara, Sangli and Solapur in Maharashtra**
	Agriculture (Single Crop)	More than 50% of district area under single crop cultivation	**Gadag (53%) & Haveri (50%) in Karnataka. Solapur(68.84%) and Sangli(57.57%) in Maharashtra.**
	Availability of Waste Land (including Fallow land, single crop & mining areas)	More than 60% of district area under Waste land, Fallow lands, Mines & Single crop	**Koppal (67%), Gadag (64%) & Chitradurga (62%) in Karnataka and Solapur(82.32%), Sangli (74.8%), Satara(70.8%) and Pune (60.10%) in Maharashtra**
	Presence of Forest cover	Negative Grading for districts with more than 10% forest cover	**Least Suitable due to Environmental parameters** Chikkamagaluru, Ballari, Belagavi, Davanagere, , Bagalkot and Satara
	Presence of Reserved Forest (including State Reserved Forests & Forest Plantations)	Negative Grading for districts with more than 10% Reserved Forest/ State Reserved Forest	Ballari, Belagavi, Bagalkot& Haveri
	Presence of Protected Areas and Wild Life Sanctuaries	Negative Grading for Presence of Wildlife Sanctuaries & Protected areas	Haveri &Belagavi

ENVIRONMENTAL PARAMETERS *Objective:* • ***Identify areas with relatively maximum flatter terrain*** • ***Identify location with perennial Surface drainage system*** • ***Identify areas with least soil fertility*** • ***Identify areas rich in mineral wealth***		**Elevation and Slope**	With more than 65% of land area with 0-10% slope range & more than 80% of land area with relatively uniform elevation	**Bagalkot & Dharwad**
		Hydrology	Highest density of Perennial Rivers (above 0.075 km/sqkm)	**Kolhapur, Satara &Bagalkot**
		Geology (Minerals)	Districts with maximum mineral wealth	**Chitradurga (12), Hassan (12), Davangere(9), Ballari (5) &Chikkamagaluru**
		Soil	With more than 50% of land area under Black soil & Rocky outcrops	**Dharwad (70%), Gadag(63%) &Bagalkote (59%)**
DEMOGRAPHIC INDICATORS *Objective:* • ***Identify areas with good demographic parameters to facilitate benifts to maximum population*** • ***Availability of Human resources*** • ***Identify areas with maximum urban population***		**Population**	With more than 5 million Population	**Pune (9.4 million)**
		Decadal Growth Rate	High decadal growth rate	**Pune (30.37%)**
		Population Density	Above 500 persons/ sqkm	**Pune (603ppsqkm) & Kolhapur (504 ppsqkm)**
		Urban population Share	More than 50% Urban population	**Pune (61%) & Dharwad (56.82%)**
SOCIO ECONOMIC PARAMETERS *Objective:* • ***Identifying the location's potential to facilitate economic growth*** • ***Identifying best& skilled human resource*** • ***Identifying areas with best Social Parameters*** • ***Identifying suitability of the location for business development***	**ECONOMIC SCENARIO**	**GDDP contribution**	Above INR 50,000 Crs	**Pune (around INR 90,000 Crs)**
		Contribution of secondary sector to GDDP	Above 30%	**Pune (43%) &Ballari (31%)**
		Growth rate of GDDP	Above 8%	**Haveri (8.73%) & Sangli (8.62%)**
		Per capita Income	Above INR 65,000/- per annum	**Pune, Kolhapur, Sangli, Satara, Solapur & Dharwad**
	SOCIAL COMPONENT	**Educational Infrastructure (No: of ITIs / Polytechnics/ engineering institutes)**	Maximum No. of Technical Institutes	**Pune (194), Hassan (94), Kolhapur(76)**
		Proximity to existing urban centers	Proximity to Major Urban centers (population above 5 million)	**Pune**
		Human Development Index (HDI)	Above 0.7	**Pune (0.722)**
		Work Force Participation Rate	Above 50%	**Chitradurga (51.62%), Chikkamagaluru (51.39%) & Hassan (50.51%)**
		Non agricultural Work Force	Above 60%	**Pune (67.9%)**
		Growth rate of Non Agricultural Work Force	Above 50%	**Pune (53.8%)**
		Literacy Rate	Literacy above 75%	**Pune, Satara, Kohlapur, Sangli, Dharwad, Solapur, Haveri, Davangere, Hassan & Gadag**
INDUSTRIAL SCENARIO *Objective:* • ***explore suitability for industrial development*** • ***Presence of Industrial environment***		**Industrial Employment**	Above 1.5 Lakhs industrial employees	Belagavi (173151) & Dharwad (around 15000)
		Presence of Industrial Development	Above 30,000 units	Pune &Belagavi
		Presence of Large Scale Industries	More than 40	Pune &Ballari

& possible supply chain • *Industrial Infrastructure*		**Proximity of Dhabol-Bengaluru Gas Pipelines**	More than 80% of land area within 50 km reach of Gas Pipeline	Gadag (almost 100%),Kolhapur (almost 100%), Chitradurga (90%), Dharwad (around 80%) &Belagavi(around 80%)
TRANSPORT INFRASTRUCTURE *Objective:* • *To assess the availability & accessibly to various transport infrastructure facilities* • *Availability, accessibility & status of road infrastructure* • *Availability, accessibility & status of rail infrastructure* • *Availability & accessibility to rail Logistical infrastructure* • *Connectivity & Proximity to Major Ports* • *Connectivity & Proximity to Major Ports*	**Road**	**Presence of major Road Junctions (NH)**	Intersection/ junction of 3 or more NHs	**Pune, Dharwad & Solapur**
		Total Road density (all road types)	above 1km/sqkm	**Kolhapur (1.03)**
		Road density (NH &SH)	Above 0.15 km/sqkm	**Belagavi (0.19), Hassan (0.18), Gadag (0.17),Dharwad (0.16) & Bagalkot (0.15) in Karnataka and Kolhapur(0.17) in Maharshtra**
	Rail	**Rail Index /density**	Above 30km/ 1000 sqkm	**Solapur (52.95), Sangli (37.72), Dharwad (33.23) & Hassan (32.66)**
		Presence of Rail freight terminals	more than 10 freight terminals or presence of Container Terminal/ Inland Container Depot	**Ballari (10 freight loading terminals & 1 Container Rail Terminal)**
		Presence of Rail junctions	with 2 or more major junctions with connectivity to multiple destinations	**Dharwad, Pune & Solapur**
		Proposed Rail links	with broad gauge proposals connecting major urban centres or ports	**Dharwad, Chitradurga & Davangere**
	Air ports	**Proximity to Airports (proposed and existing)**	With Operational Airport	**Pune, Dharward, Solapur, Belagavi, Kolhapur & Satara**
	Port	**Proximity to Major Ports (Distance)**	Less than or equal to 175 kms	**Dharwad, Pune, Hassan &Belagavi**
		Direct Port Connectivity	Proximity & direct NH & Rail connectivity	**Dharwad, Pune, Hassan, Belagavi**
WATER *Objective* • *Accessibility & availability of surface water* • *Status of Ground water*		**Proximity to Major Water Sources**	Maximum no. of sub districts with major reservoirs or in close proximity to major reservoirs	**Koppal, Chikkamagaluru,Bagalkot, Hassan, Satara & Pune**
		Ground Water Status	More than 75% of area under Safe category of GW status	**Dharwad, Kolhapur, Pune, Sangli, Satara & Solapur**
POWER *Objective* • *To identify areas in proximity to major power sources* • *Areas with Potential for Green Energy*		**Installed Power Capacity**	With more than 1500 MW installed capacity	**Satara (1979.5 MW)**
		Proximity to Renewable Power sources	Above 500 MW of installed capacity	**Chitradurga (around 900 MW), Satar (around 870 MW) and Sangli (around 650 MW)**
AVAILABILITY OF LAND	**STATUS OF LAND ACQUIS**	**Total land under acquisition process**	Above 10,000 acres	**Ballari (around 20,000 acres)& Satara (around 17500 acres)**

Objective: • **identify districts with land availability for development** • **indentify districts which are potential land banks**		**Availability of Contiguous land parcels**	5 or more contiguous parcels above 500 acres totalling above 10000 acres	**Ballari (8)**
		Notified proposed to be continued and under acquisition	with notified and proposed to be continued land above 10,000	**Ballari**
	GOVT. LAND HOLDINGS	**Total land holdings**	above above 1000 sqkm	**Pune (3285 sqkm) , Sangli (1495 sqkm), Satara(1486 sqkm) and Ballari(1161.23 sqkm)**
		Availability of contiguous land parcels > 500 acres	More than 35 land parcels above 500 acres	**Ballari (37), Sangli (116), Satara(74) & Pune (62)**
HERITAGE *Objective:* • **Identify location which are of historical & Heritage significance to exclude/ conserve/ protect from industrial development**		**Presence of Heritage & Archeological Sites**	Negative Grading for more than 50 Heritage Sites & presence of World Heritage Sites (or) Presence of World Heritage Sites & More than 20 site of National Heritage Significance	**Haveri (96), Ballari (21 National, 1 World Heritage site & 5 State) &Belagavi (21 National & 33 State Heritage Site)**

The above assessment is supported by elaborate GIS based mapping & analysis and comparative analysis of the districts through Radar Graph Analysis for each of the parameters. The following set of illustration is compilation of the GIS maps & Radar Graphs used to arrive at the above summarized assessment.

Figure: GIS based Mapping & analysis for all Sub- Parameters of Location Suitability Assessment

Land Use/ Land Utilization Assessment

Land Use: Agriculture (Double Crop + Plantation)

Land Use: Agriculture (Double Crop + Plantation)

Land Use: Agriculture (Single Crop)

Land Use: Agriculture (Single Crop)

Land Use: Forest Cover

Land Use: Forest Cover

Land Use: Forest Types

Land Use: Wasteland, Fallow land, Single Crop & Mining

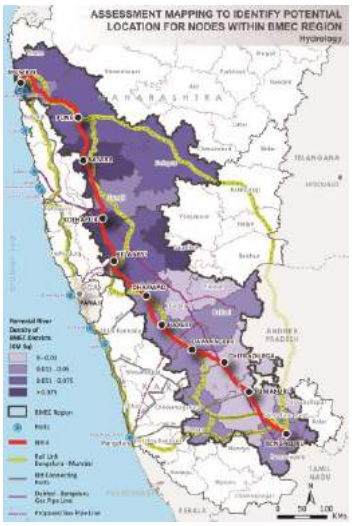
Land Use: Wasteland, Fallow land, Single Crop & Mining

Environmental Parameters

Environment

Environment

Environment: Hydrology - River Basins & Major Reservoirs

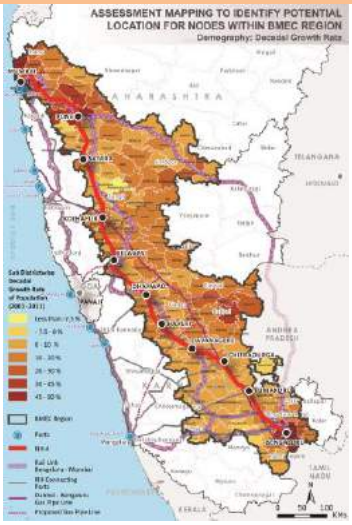


Hydrology

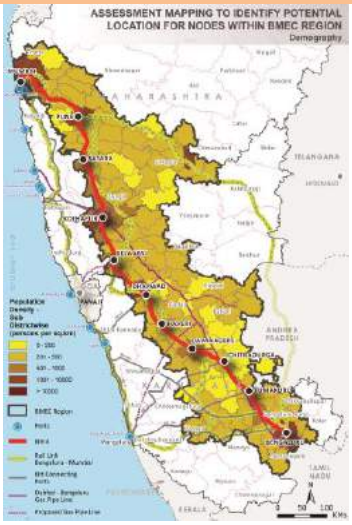
Geology: Minerals

Demographic Indicators

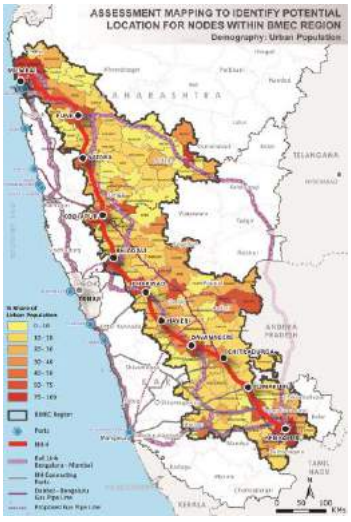
Demography: Population Distribution



Demography: Decadal Growth Rate

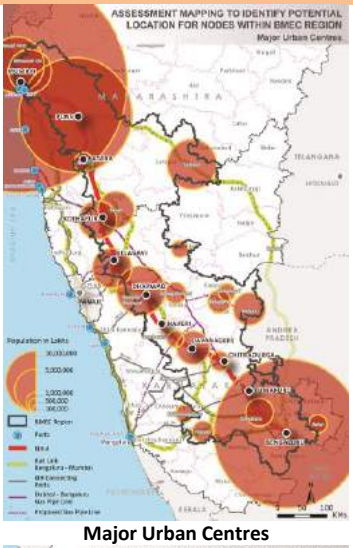


Demography: Population Density



Demography: Urban Population

Socio Economic Parameters



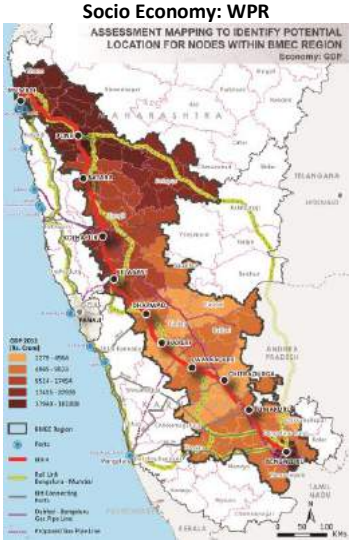
Major Urban Centres

Socio Economy: Literacy Rate

Socio Economy: WPR

Socio Economy: Non Agricultural Work Force

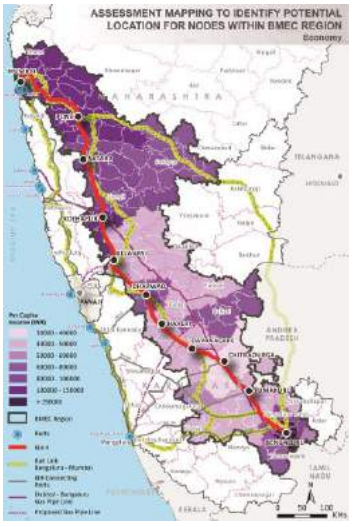
Socio Economy: Decadal Growth Rate of Non Agricultural Work Force



Economy: GDP

Economy: Year on Year Growth Rate of GDP

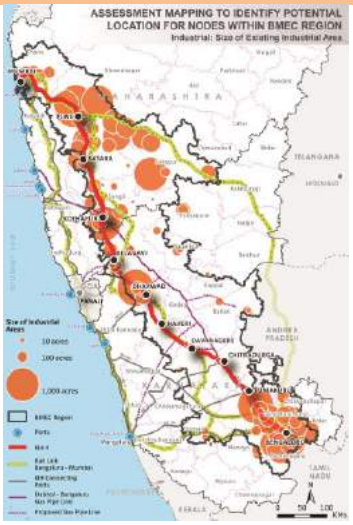
Economy: Secondary Sectors Contribution to GDP



Economy: Per capita Income

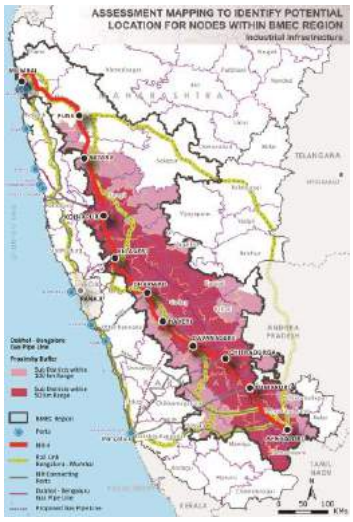
Industrial Scenario

Industries: Industrial Area



Industries: Size of Existing Industrial Area

Industries: Location of KIADB, MIDC & Other Industrial Estates

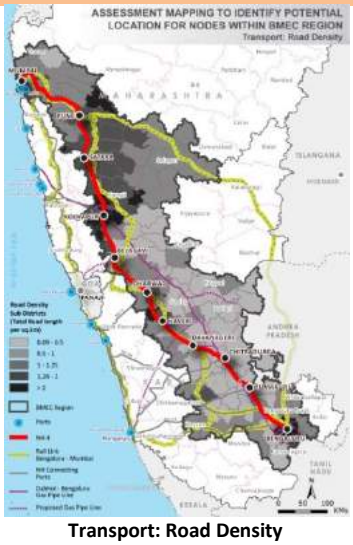


Industries: Industrial Infrastructure

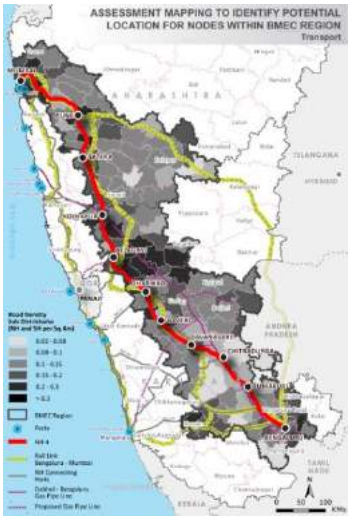
Transport Infrastructure

Transport: Roads

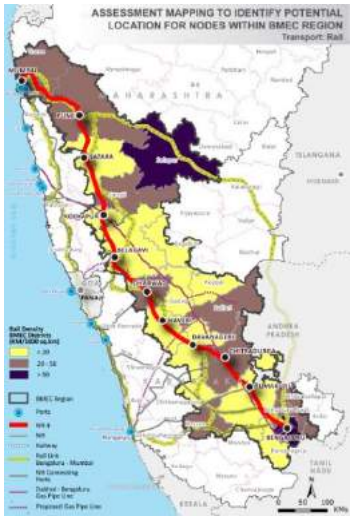
Transport:



Transport: Road Density

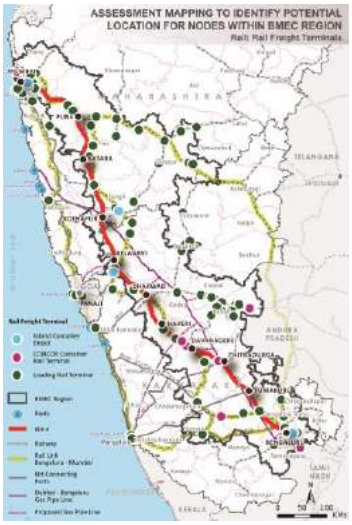


Transport: Road Density



Transport: Rail Density

Transport: Rail Distribution



Transport: Rail Freight Terminals

Transport: Major Rail Junctions

Transport: Rail Freight Terminals

Transport: Airport

Transport: Port Connectivity

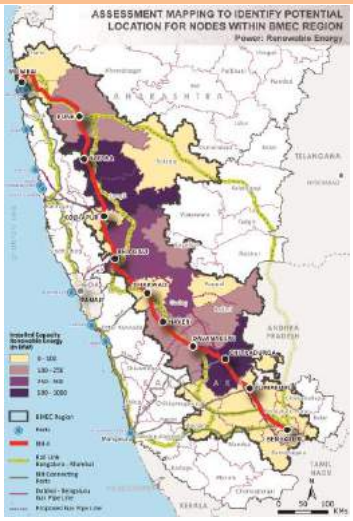
Water

Water Resources

Hydrology: Ground Water

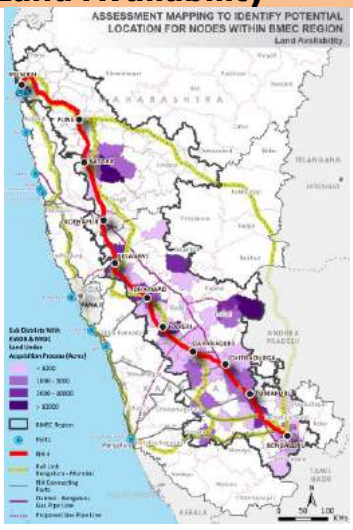
Power

Power: Total Installed Power Capacity

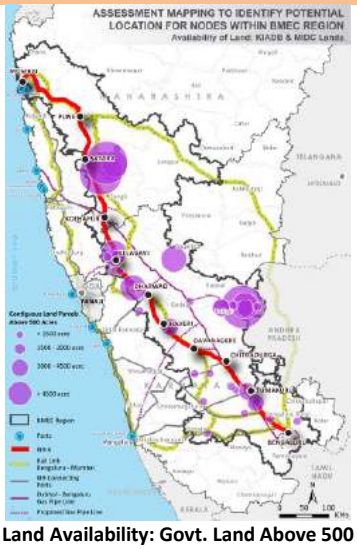


Power: Renewable Energy

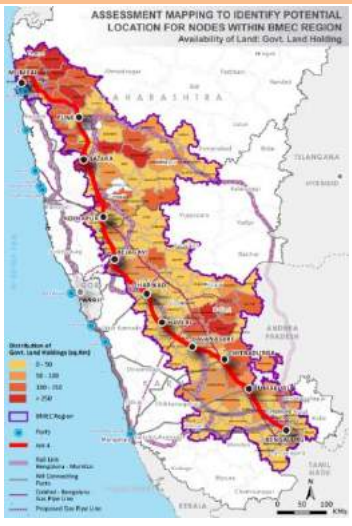
Land Availability



Land Availability

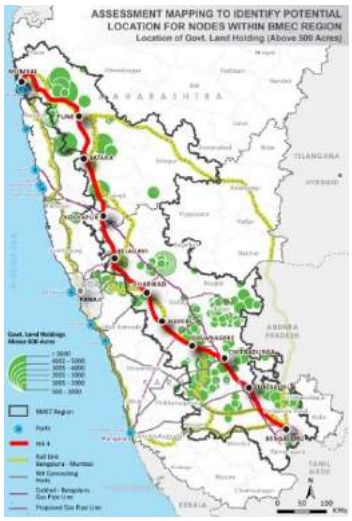


Land Availability: Govt. Land Above 500 Acres



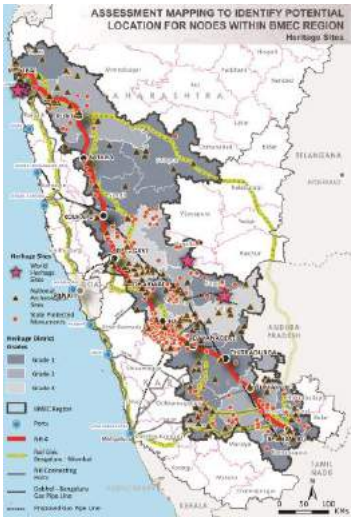
Land Availability: Govt. Land Holding

Land Availability



Land Availability: Govt. Land Holding Above 500 Acres

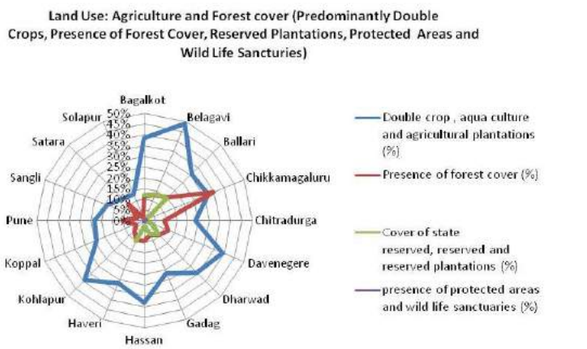
Others



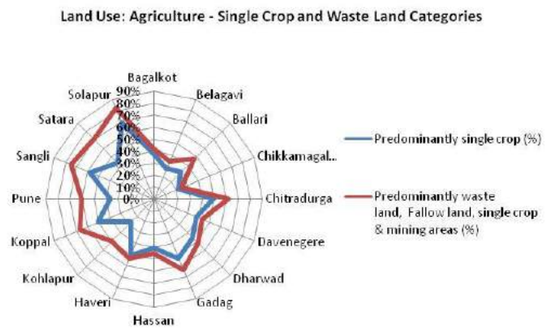
Heritage Sites

Figure: Radar Graph analysis for all Sub- Parameters of Location Suitability Assessment

LAND USE/ LAND UTILIZATION

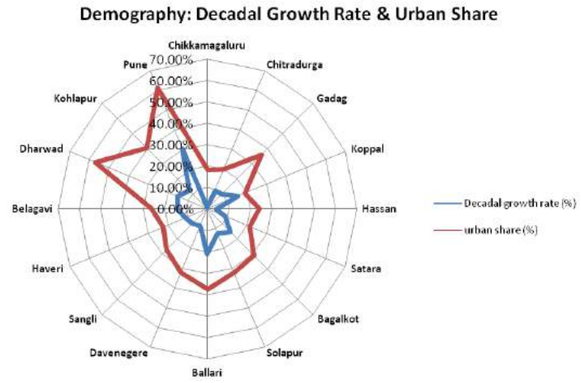


% represents the percentage of area covered by the sub parameter in the respective districts

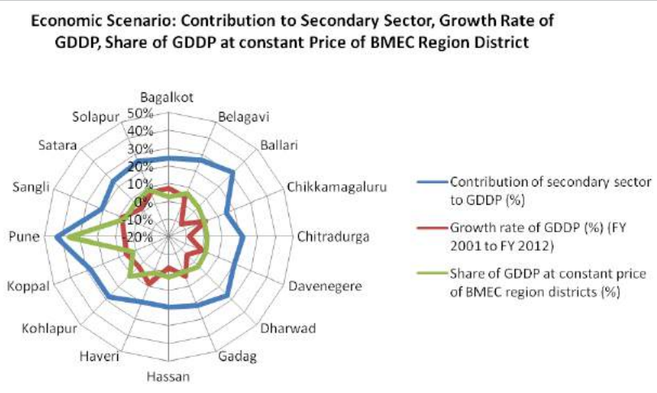


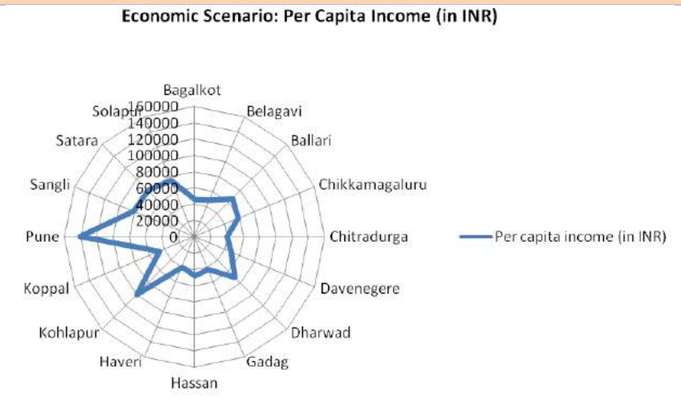
% represents the percentage of area covered by the sub parameter in the respective districts

DEMOGRAPHY

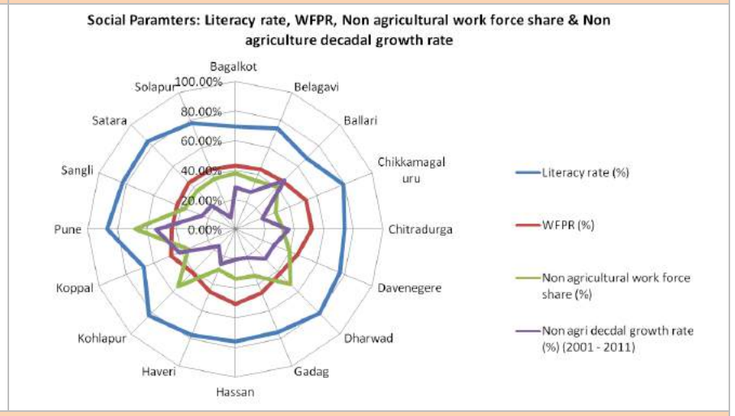


SOCIO ECONOMIC PARAMETERS - Economic Scenario

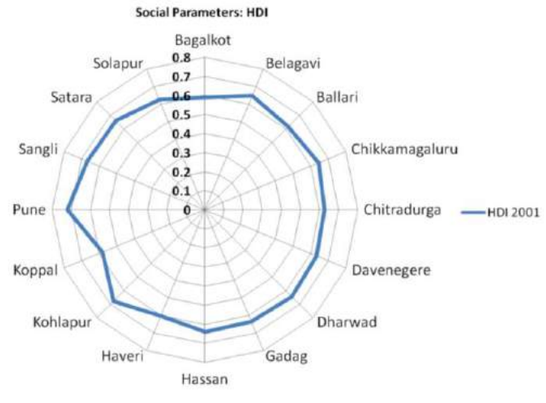




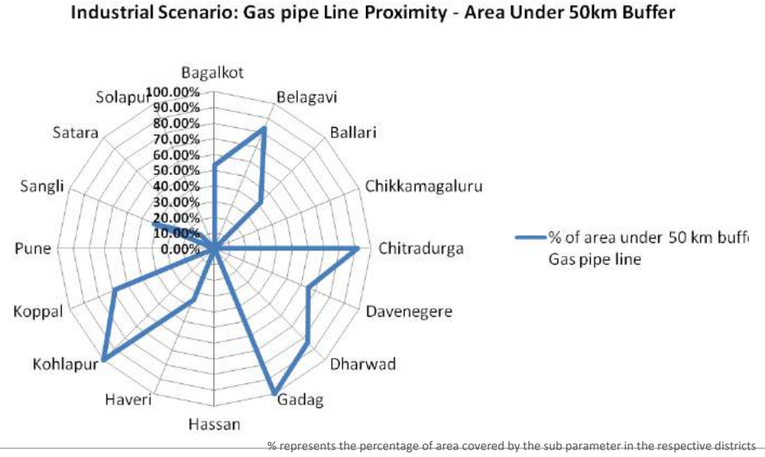
SOCIO ECONOMIC PARAMETERS - Social Components



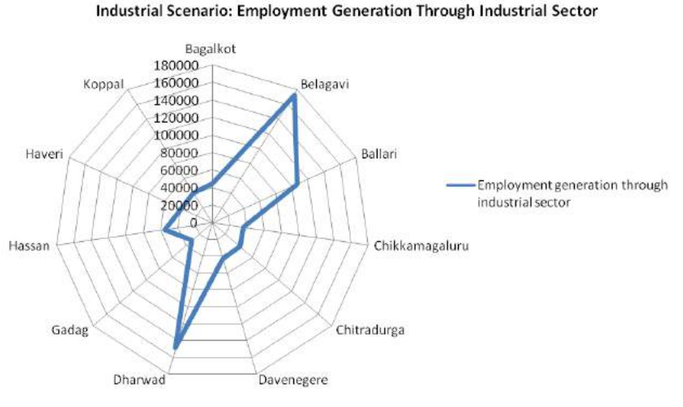
SOCIO ECONOMIC PARAMETERS - Social Components



INDUSTRIAL SCENARIO

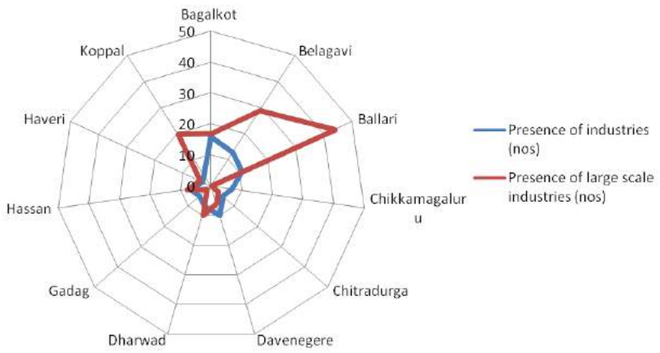


% represents the percentage of area covered by the sub parameter in the respective districts



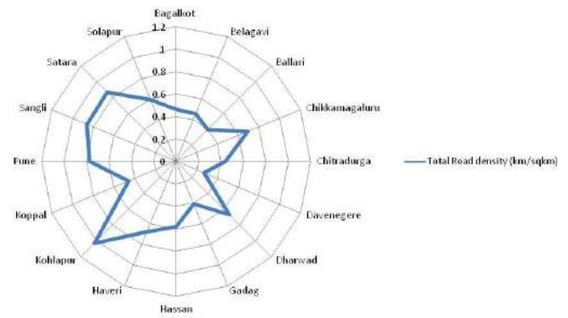
INDUSTRIAL SCENARIO

Industrial Scenario: Presence of Industries

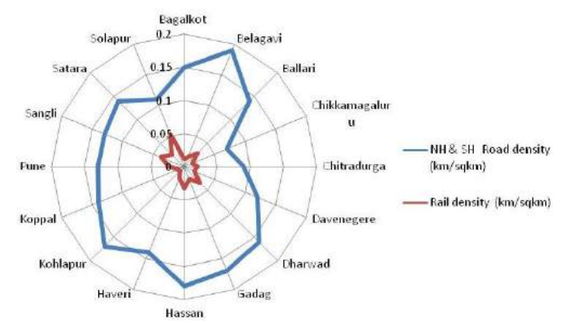


TRANSPORT INFRASTRUCTURE

Transport Infrastructure: Total Road Density

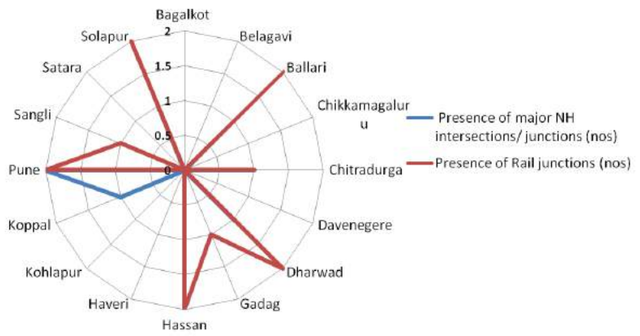


Transport Infrastructure: NH, SH and Rail Density

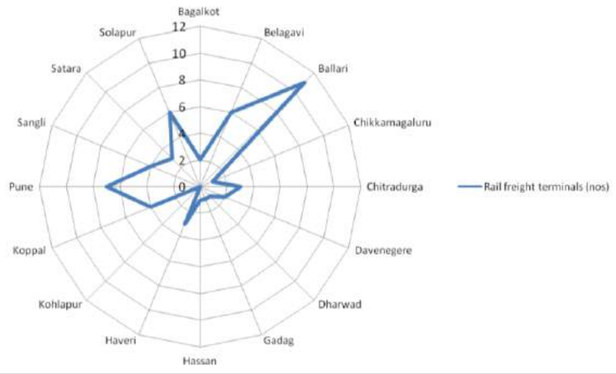


TRANSPORT INFRASTRUCTURE

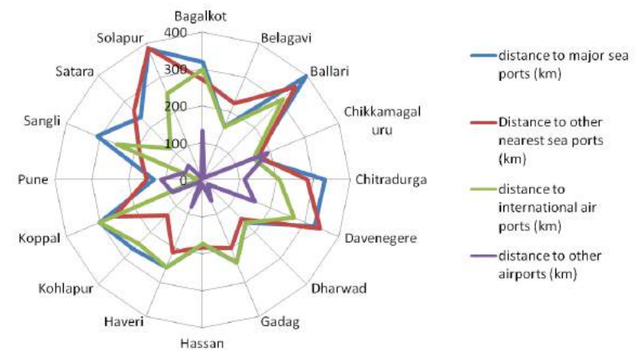
Transport Infrastructure: Road and Rail Junctions



Transport Infrastructure: Rail Frieght Terminals



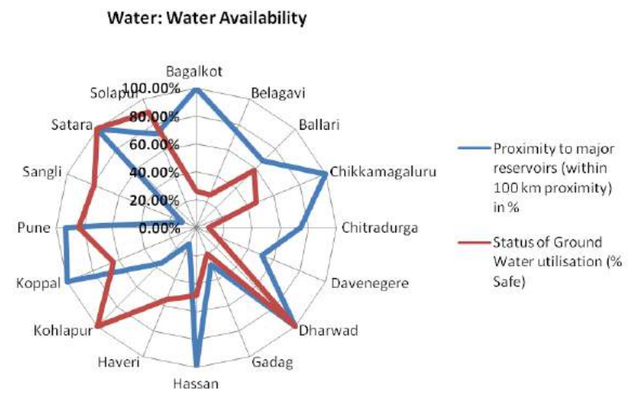
Transport Infrastructure: Proximity to Sea Ports & Airports



Districts with lesser distance (km) has better proximity to port

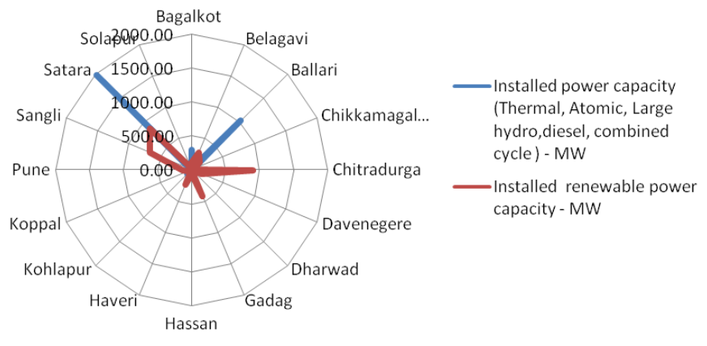
WATER

Water: Water Availability



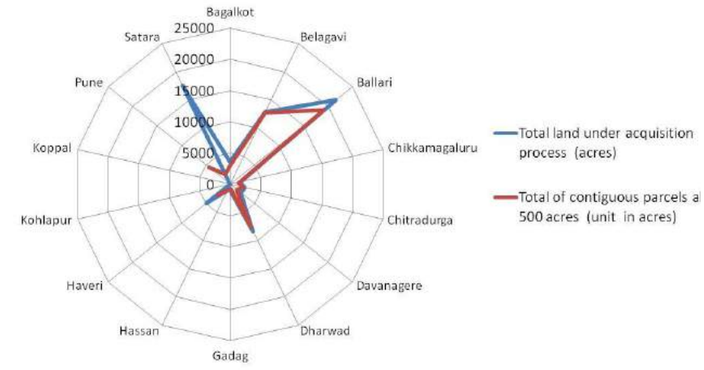
POWER

Power: Installed Capacity of Conventional Energy Sources & Renewable Sources (MW)



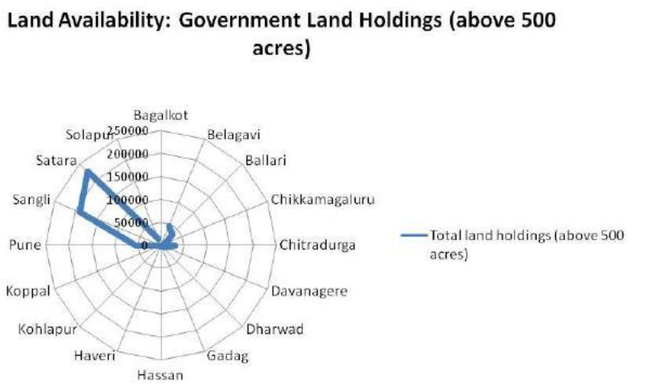
LAND AVAILABILITY

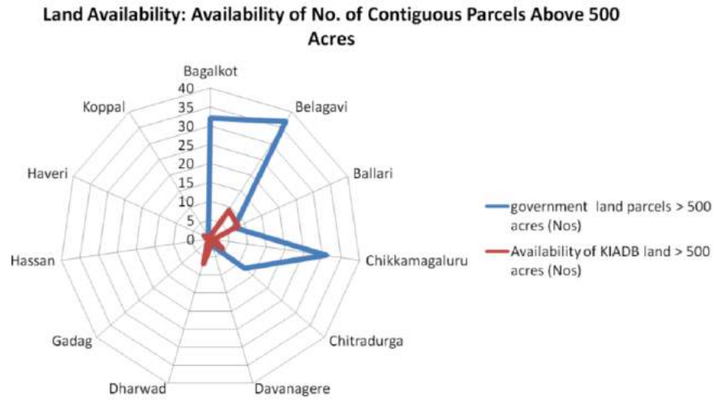
Land Availability: Status of Land Acquisition (KIADB, MIDC)



% represents the percentage of area covered by the sub parameter in the respective districts

LAND AVAILABILITY

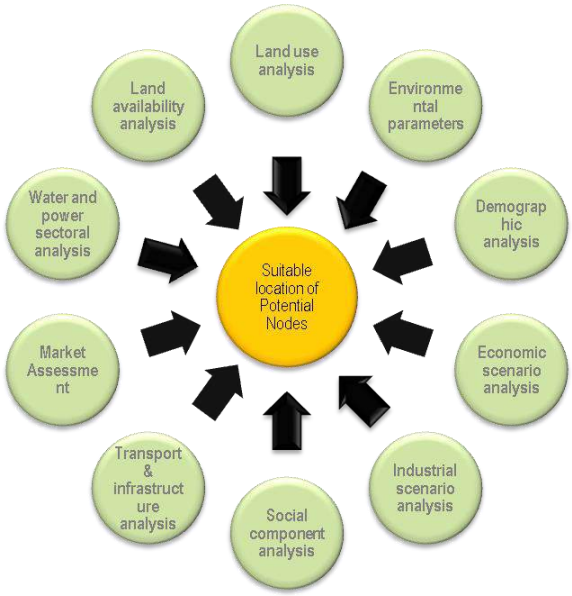




10.4Suitability Matrix

Based on the assessment of various Parameters & Sub- Parameters analysed as part of Location Suitability Assessment as explained in the previous sections of this report, a suitability matrix is carried out in order to identify the core district wise location of the industrial l nodes/ mega cities. The figure given below illustrates the major themes/ parameters considered for identifying the suitable location of the nodes.

Figure: Broad parameters considered for location of potential nodes



The core districts which were Graded between 1 to 3 under each parameters in the Location Suitability Assessment , will be awarded with a score of 3 to 1. i.e. the highest score of 3 assigned to Grade 1 & lowest score of 1 assigned to Grade 3 districts. In this process the unfavourable sub-parameters are assigned with negative scoring i.e. presence of reserved forest or ecologically sensitive areas etc., are assigned with negative scoring as these are not favourable for industrial development. The sum of scores made for each parameter by each district will determine its suitability for Nodes/ Mega Cities. The following table illustrates the same:

Table: Grade based scores

Category	Score awarded
Grade 1	3
Grade 2	2
Grade 3	1

Based on the scoring assigned for each sub-parameter, the total score of each district would be determined.

Relative Weightage Scoring:

The above-mentioned system might not provide an accurate assessment in determining the best suitable location, as the district having Grad 1 under parameters with more number of sub-parameters, would obviously emerge as the best suitable district, irrespective of the significance of the Sub-Parameters. To avoid such imbalanced scoring & to identify the districts based on

parameters which are more relevant for industrial development, a weightage based scoring is proposed. In this process the most important sub-parameters which play a significant role in determining the suitability of the districts for locating the nodes will be assigned with higher weightage when compared to other sub-parameters. The objective of the process is to have relative scoring between the sub-parameters based on its significance for industrial development. A range of 1 to 5 is adopted as the weightage score, with 5 being the highest score for most significant parameters and 1 for least significant parameters.

The product of grading score with the weightages assigned to the individual sub-parameters would determine the final score which would be assessed to identify the best suitable districts. The following table provides the relative weightage assigned to each of the sub-parameter.

Based on the computations of the grades of the core districts along with the weightages awarded to the individual sub parameters, the final hierarchy of the core districts based on their suitability to locate industrial nodes are as given below. (The computations and further details are provided in the annexure)

Two Tier Suitability Assessments: Location suitability assessment was done at two levels: - 1) Suitability assessment without land availability component and 2) comprehensive suitability assessment including land availability component.

1) Suitability assessment without land availability component- The initial assessment is done without considering the land availability in each district because excluding the land availability component gives a clear picture of the importance of the districts and the subsequent taluks based on the locational prominence in various parameters such as land use/ utilization, environmental parameters, demographic indicators, socio economic parameters, industrial scenario, transport and other infrastructure etc. The matrix given below shows the scoring for individual core districts excluding the land availability component.

Table: Suitability Matrix (Location Suitability Assessment for Nodes/Mega Cities)

SUITABILITY MATRIX (LOCATION SUITABILITY ASSESSMENT FOR NODES/MEGA CITIES)

State	PARAMETERS	LAND USE / LAND UTILISATION						ENVIRONMENTAL PARAMETERS				DEMOGRAPHIC INDICATORS				SOCIO ECONOMIC PARAMETERS								INDUSTRIAL SCENARIO				TRANSPORT INFRASTRUCTURE									WATER			POWER		OTHERS		Total (Grading Based Scoring)
																ECONOMIC SCENARIO				SOCIAL COMPONENT											Road			Rail				Airport	Port								
	Sub Parameter Weightage (1 to 5)	1	2	5	1	1	1	1	3	4	2	1	2	2	2	2	3	3	2	3	4	3	3	4	5	3	4	4	4	4	5	4	5	5	4	3	3	4	5	4	4	2	2	3	3	
	BMEC Region Core Districts	AGRICULTURE: Double crop & Agricultural plantations	AGRICULTURE: Single crop	WASTE LAND: Waste land, Fallow land & Mining areas	FOREST: Forest Cover	FOREST: Reserved Forest & State Reserved	FOREST: Protected Areas & Wild Life Sanctuaries	Elevation and Slope	HYDROLOGY: River Basins & Perennial River Density	GEOLOGY : Mineral Resources	GEOLOGY : Soil Types	Population	Decadal Growth Rate	Population Density	Urban population Share	GDDP	Secondary Sector share of GDDP	Growth rate of GDDP	Per capita income	Educational infrastructure	Proximity to Urban Centres	HDI	Work Force Participation Rate	Non Agricultural Workers	Growth rate of Non Agricultural Workers	Literacy Rate	Employment through Industrial Sector	Presence of Industries	Presence of Large Scale Industries	Proximity to Gas Pipeline	Presence & Proximity to Major NH Intersections/ Junctions	Total Road Density	NH & SH Density	Rail Density/ Index	Rail Freight Terminals	Presence of Rail junctions	Proposed Rail links	Presence & Proximity to Airports	Proximity to Major Ports	Connectivity to Ports	Water Availability	Proximity to Surface Water Sources	Ground Water Status	Installed Power Capacity (Conventional Energy Sources)	Installed capacity (Renewable Power Sources)	Presence of Heritage Sites	
Karnataka	Chitradurga	2	2	3	0	0	0	0	0	3	1	0	0	0	0	0	1	0	1	0	2	2	3	0	1	2	1	2	0	3	2	0	1	2	2	0	3	1	0	1	1	2	0	0	3	0	47
	Haveri	1	3	2	0	-1	-1	2	1	1	2	0	0	2	1	0	1	3	2	0	2	1	2	0	1	3	1	1	0	2	0	2	2	1	1	0	1	2	1	2	1	1	2	0	1	-2	47
	Davengere	1	1	0	0	0	0	0	0	3	1	1	0	2	2	1	2	0	2	1	2	2	1	0	1	3	1	1	0	2	0	0	2	1	2	0	3	1	0	1	3	2	0	0	1	0	46
	Dharwad	2	2	2	0	0	0	3	0	2	3	1	1	2	3	1	2	0	3	2	2	2	1	2	1	3	3	2	1	3	3	2	3	3	0	3	3	3	3	3	1	2	3	0	0	0	81
	Bellary	1	1	1	-1	-1	0	0	0	3	2	1	2	2	2	1	3	0	3	1	1	1	2	1	2	1	2	2	3	2	0	0	2	2	3	2	0	3	0	1	2	2	2	2	1	-2	58
	Belgaum	0	1	0	-1	-1	-1	1	2	1	2	2	1	2	1	2	2	1	2	1	2	2	1	0	1	2	3	3	2	3	2	1	3	1	2	0	0	3	3	3	3	2	1	1	2	-2	62
	Hassan	2	2	1	0	0	0	0	1	3	1	0	0	1	1	1	0	0	2	3	2	2	3	0	0	3	2	2	0	1	1	1	3	3	0	2	2	3	3	3	3	3	1	0	0	0	61
	Bagalkot	1	1	0	-1	-1	0	3	3	1	3	0	1	1	2	1	0	2	2	1	1	1	1	0	1	1	1	1	0	2	0	1	3	0	1	0	1	1	0	0	1	3	1	1	1	-1	42
	Gadag	2	3	3	0	0	0	0	0	2	3	0	0	0	2	0	0	1	2	0	1	2	2	0	0	3	1	1	0	3	0	0	3	1	0	0	1	2	1	2	1	1	0	1	2	-1	45
	Koppal	2	2	3	0	0	0	0	0	1	2	0	1	1	0	0	0	2	2	1	1	1	2	0	2	1	1	1	0	0	0	1	2	0	1	0	2	2	0	1	1	3	2	1	0	0	42
	Chikmagalur	0	0	0	-1	0	0	0	1	3	1	0	0	0	0	0	0	1	2	1	0	2	3	0	0	0	0	1	0	1	0	2	0	0	0	0	0	2	0	3	1	1	0	0	0	0	24
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Maharashtra	Kolhapur	0	1	1	0	0	0	1	3	1	0	2	0	3	2	2	2	1	3	3	2	2	1	2	0	3	2	2	2	3	2	3	3	0	0	0	0	3	2	2	0	1	3	1	0	0	64
	Sangli	2	3	3	0	0	0	2	1	0	0	0	0	2	1	2	1	3	3	2	2	2	1	0	0	3	0	0	0	2	0	2	2	3	2	1	0	0	1	1	2	1	3	1	3	0	57
	Satara	2	2	3	-1	0	0	0	3	0	0	1	0	1	1	2	2	1	3	2	1	2	1	0	0	3	0	2	0	2	0	2	2	1	1	0	2	3	1	2	1	3	3	3	3	0	60
	Pune	2	1	3	0	0	0	0	2	0	0	3	3	3	3	3	3	2	3	3	3	3	1	3	3	3	3	3	3	1	3	2	2	2	2	3	0	3	3	3	2	3	3	1	1	-1	92
	Solapur	2	3	3	0	0	0	0	2	0	0	2	1	1	2	2	0	2	3	2	2	2	1	0	0	3	0	0	0	0	3	1	1	3	2	3	0	3	0	1	0	2	3	0	0	0	55

Suitability Legend

3	Best Suitable Grade 1 Districts (Maximum Score 3)
2	Moderately Suitable Grade 2 Districts (Score 2)
1	Suitable Grade 3 Districts (Score 1)
	Least Suitable / Data Not Available/ Not Applicable
-1	Unfavourable Parameters with negative scoring (-1)
-2	Unfavourable Parameters with negative scoring (-2)

SUITABILITY MATRIX (LOCATION SUITABILITY ASSESSMENT FOR NODES/MEGA CITIES)- *TOTAL SCORING SHEET*

State	PARAMETERS	LAND USE / LAND UTILISATION						ENVIRONMENTAL PARAMETERS				DEMOGRAPHIC INDICATORS				SOCIO ECONOMIC PARAMETERS								INDUSTRIAL SCENARIO				TRANSPORT INFRASTRUCTURE									WATER			POWER		OTHERS		Total (Grading & Weightage Based Scoring)
																ECONOMIC SCENARIO				SOCIAL COMPONENT											Road			Rail				Airport	Port								
	BMEC Region Core Districts	AGRICULTURE: Double crop & Agricultural plantations	AGRICULTURE: Single crop	WASTE LAND: Waste land, Fallow land & Mining areas	FOREST: Forest Cover	FOREST: Reserved Forest & State Reserved	FOREST: Protected Areas & Wild Life Sanctuaries	Elevation and Slope	HYDROLOGY: River Basins & Perennial River Density	GEOLOGY : Mineral Resources	GEOLOGY : Soil Types	Population	Decadal Growth Rate	Population Density	Urban population Share	GDDP	Secondary Sector share of GDDP	Growth rate of GDDP	Per capita income	Educational infrastructure	Proximity to Urban Centres	HDI	Work Force Participation Rate	Non Agricultural Workers	Growth rate of Non Agricultural Workers	Literacy Rate	Employment through Industrial Sector	Presence of Industries	Presence of Large Scale Industries	Proximity to Gas Pipeline	Presence & Proximity to Major NH Intersections/ Junctions	Total Road Density	NH & SH Density	Rail Density/ Index	Rail Freight Terminals	Presence of Rail junctions	Proposed Rail links	Presence & Proximity to Airports	Proximity to Major Ports	Connectivity to Ports	Water Availability	Proximity to Surface Water Sources	Ground Water Status	Installed Power Capacity (Conventional Energy Sources)	Installed capacity (Renewable Power Sources)	Presence of Heritage Sites	
Karnataka	Chitradurga	2	4	15	0	0	0	0	0	12	2	0	0	0	0	0	3	0	2	0	8	6	9	0	5	6	4	8	0	12	10	0	5	10	8	0	12	3	0	5	4	8	0	0	9	0	172
	Haveri	1	6	10	0	-1	-1	2	3	4	4	0	0	4	2	0	3	9	4	0	8	3	6	0	5	9	4	4	0	8	0	8	10	5	4	0	4	6	4	10	4	4	4	0	3	-6	157
	Davengere	1	2	0	0	0	0	0	0	12	2	1	0	4	4	2	6	0	4	3	8	6	3	0	5	9	4	4	0	8	0	0	10	5	8	0	12	3	0	5	12	8	0	0	3	0	154
	Hubli- Dharwad	2	4	10	0	0	0	3	0	8	6	1	2	4	6	2	6	0	6	6	8	6	3	8	5	9	12	8	4	12	15	8	15	15	0	9	12	9	12	15	4	8	6	0	0	0	269
	Bellary	1	2	5	-1	-1	0	0	0	12	4	1	4	4	4	2	9	0	6	3	4	3	6	4	10	3	8	8	12	8	0	0	10	10	12	6	0	9	0	5	8	8	4	4	3	-6	194
	Belgaum	0	2	0	-1	-1	-1	1	6	4	4	2	2	4	2	4	6	3	4	3	8	6	3	0	5	6	12	12	8	12	10	4	15	5	8	0	0	9	12	15	12	8	2	2	6	-6	218
	Hassan	2	4	5	0	0	0	0	3	12	2	0	0	2	2	2	0	0	4	9	8	6	9	0	0	9	8	8	0	4	5	4	15	15	0	6	8	9	12	15	12	12	2	0	0	0	214
	Bagalkot	1	2	0	-1	-1	0	3	9	4	6	0	2	2	4	2	0	6	4	3	4	3	3	0	5	3	4	4	0	8	0	4	15	0	4	0	4	3	0	0	4	12	2	2	3	-3	130
	Gadag	2	6	15	0	0	0	0	0	8	6	0	0	0	4	0	0	3	4	0	4	6	6	0	0	9	4	4	0	12	0	0	15	5	0	0	4	6	4	10	4	4	0	2	6	-3	150
	Koppal	2	4	15	0	0	0	0	0	4	4	0	2	2	0	0	0	6	4	3	4	3	6	0	10	3	4	4	0	0	0	4	10	0	4	0	8	6	0	5	4	12	4	2	0	0	139
	Chikmagalur	0	0	0	-1	0	0	0	3	12	2	0	0	0	0	0	0	3	4	3	0	6	9	0	0	0	0	4	0	4	0	8	0	0	0	0	0	0	0	10	0	12	2	2	0	0	83
Maharashtra	Kolhapur	0	2	5	0	0	0	1	9	4	0	2	0	6	4	4	6	3	6	9	8	6	3	8	0	9	8	8	8	12	10	12	15	0	0	0	0	9	8	10	0	4	6	2	0	0	207
	Sangli	2	6	15	0	0	0	2	3	0	0	0	0	4	2	4	3	9	6	6	8	6	3	0	0	9	0	0	0	8	0	8	10	15	8	3	0	0	4	5	8	4	6	2	9	0	178
	Satara	2	4	15	-1	0	0	0	9	0	0	1	0	2	2	4	6	3	6	6	4	6	3	0	0	9	0	8	0	8	0	8	10	5	4	0	8	9	4	10	4	12	6	6	9	0	192
	Pune	2	2	15	0	0	0	0	6	0	0	3	6	6	6	6	9	6	6	9	12	9	3	12	15	9	12	12	12	4	15	8	10	10	8	9	0	9	12	15	8	12	6	2	3	-3	306
	Solapur	2	6	15	0	0	0	0	6	0	0	2	2	2	4	4	0	6	6	6	8	6	3	0	0	9	0	0	0	0	15	4	5	15	8	9	0	9	0	5	0	8	6	0	0	0	171

Based on the computations of the grades of the core districts along with the weightages awarded to the individual sub parameters, the final hierarchy of the core districts based on their suitability to locate industrial nodes are as given below.

Classification of final score computed	Districts	Grade
>250	**Pune, Dharwad**	**Grade 1**
200-250	**Belagavi, Hassan, Kolhapur, Ballari**	**Grade 2**
150-200	**Satara, Sangli, Chitradurga, Solapur, Haveri, Davanagere, Gadag**	**Grade 3**

As per this assessment excluding the land availability component, Pune and Dharwad city stands as grade 1 owing to their prominence and location suitability. Given below is the list of prominent taluks/ Sub districts in core region of BMEC excluding the land availability component.

Table: Prominent core district wise taluks as per suitability assessment (excluding land availability component)

Grading excluding land availability	Core district	Prominent taluks/ sub districts
Grade 1	Pune	Baramati, Haveli, Khed, Mulshi, Pune city, Shirur
	Dharwad	Dharwad, Hubballi, Kalghatgi, Kundol
Grade 2	Belagavi	Belagavi, Chikodi, Gokak, Ramdurg
	Hassan	Hassan, Belur, Arsikere, Alur
	Kolhapur	Hatkanangle , Karvir
	Ballari	Ballari, Hosapete, Sandur, Hadagalli,
Grade 3	Satara	Karad, Khatav, Khandala
	Sangli	Miraj, Palus, Walwa, Kadegaon, Tasgaon
	Chitradurga	Chalakere, Molakalmuru, Hosadurga, Holalkere
	Solapur	Mangalvedhe, Sangole, Solapur North, Solapur South
	Haveri	Ranibennur, Savanur, Shiggaon
	Davanagere	Davanagere, Harapanahalli, Jagalur
	Gadag	Gadag, Mundargi, Shirhatti, Ron

2) Comprehensive suitability assessment including land availability component- However since land availability factor is crucial in determining the location of the potential nodes, the assessment is further carried out considering the component. The matrix given below shows the scoring for individual core districts including the land availability component.

Table: Suitability Matrix on Assessment of Locating Potential Nodes

SUITABILITY MATRIX (LOCATION SUITABILITY ASSESSMENT FOR NODES/MEGA CITIES)

	PARAMETERS	LAND USE / LAND UTILISATION						ENVIRONMENTAL PARAMETERS				DEMOGRAPHIC INDICATORS				SOCIO ECONOMIC PARAMETERS								INDUSTRIAL SCENARIO				TRANSPORT INFRASTRUCTURE								WATER			POWER		LAND AVAILABILITY					OTHERS	Total (Grading Based Scoring)
																ECONOMIC SCENARIO				SOCIAL COMPONENT												Road			Rail				Airport	Port						STATUS OF LAND ACQUISITION* (KIADB, MIDC)			GOVT. LAND HOLDINGS			
	Sub Parameter Weightage (1 to 5)	1	2	5	1	1	1	1	3	4	2	1	2	2	2	2	3	3	2	3	4	3	3	4	5	3	4	4	4	4	5	4	5	4	3	4	4	4	2	3	4	4	5	4	5	3	
State	BMEC Region Core Districts	AGRICULTURE : Double crop & Agricultural plantations	AGRICULTURE: Single crop	WASTE LAND: Waste land, Fallow land & Mining areas	FOREST: Forest Cover	FOREST: Reserved Forest & State Reserved	FOREST: Protected Areas & Wild Life Sanctuaries	Elevation and Slope	HYDROLOGY: River Basins & Perennial River Density	GEOLOGY: Mineral Resources	GEOLOGY: Soil Types	Population	Decadal Growth Rate	Population Density	Urban population Share	GDDP	Secondary Sector share of GDDP	Growth rate of GDDP	Per capita Income	Educational Infrastructure	Proximity to Urban Centres	HDI	Work Force Participation Rate	Non Agricultural Workers	Growth rate of Non Agricultural Workers	Literacy Rate	Employment through Industrial Sector	Presence of Industries	Presence of Large Scale Industries	Proximity to Gas Pipeline	Presence & Proximity to Major NH Intersections/ Junctions	Total Road Density	NH & SH Density	Rail Density/ Index	Rail Freight Terminals	Presence of Rail junctions	Proposed Rail links	Presence & Proximity to Airports	Proximity to Major Ports	Connectivity to Ports	Water Availability	Proximity to Surface Water Sources	Ground Water Status	Installed Power Capacity (Conventional Energy Sources)	Installed capacity (Renewable Power Sources)	Total Land under Acquisition Process	Availability of Contiguous Land Parcels	Status of Acquisition (Notified & to be De-Notified)	Total Area of Govt Land Holdings	Availability of Contiguous land parcels > 500 acres	Presence of Heritage Sites	
Karnataka	Chitradurga	2	2	3						3	1						1		1		2	2	3		1	2	1	2		3	2		1	2	2		3	1		1	1	2			3	1		1	1	1		51
	Haveri	1	3	2		-1	-1	2	1	1	2			2	1		1	3	2		2	1	2		1	3	1	1		2		2	2	1	1	2	2	1	2	1	1	2			1		1			1		-2	49
	Davengere	1	1							3	1	1		2	2	1	2		2	1	2	2	1		1	3	1	1		2			2	1	2		3	1		1	3	2			1			1	1	1		49
	Hubballi- Dharwad	2	2	2				3		2	3	1	1	2	3	1	2		3	2	2	2	1	2	1	3	3	2	1	3	3	2	3	3		3	3	3	3	1	2	3			2	2				85
	Ballari	1	1	1	-1	-1				3	2	1	2	2	2	1	3		3	1	1	1	2	1	2	1	2	2	3	2			2	2	3	2		3		1	2	2	2	1	3	3	3	3	3	-2	73
	Belagavi		1		-1	-1	-1	1	2	1	2	2	1	2	1	2	2		1	2	2	1	2		1	2	3	3	2	3	2	1	3	1	2		3	3	3	3	2	1	1	2	2	1	2	2	2	-2	71
	Hassan	2	2	1					1	3	1			1	1	1			2	3	2	2	3			3	2	2		1	1	1	3	3		2	2	3	3	3	3	3	1			1					62
	Bagalkot	1	1		-1	-1		3	3	1	3		1	1	2	1		2	2	1	1	1	1		1	1	1	1		2		1	3		1		1			1	3	1	1	1	1					-1	43
	Gadag	2	3	3						2	3				2			1	2			2	2			3	1	1		3	1			1	2		2	1	2	1	1		1	2						-1	45
	Koppal	2	2	3						1	2		1	1					2	2	1	1	1	2		2	1	1	1			1	2			2	2		1	1	3	2	1								42
	Chikkamagaluru				-1				1	3	1							1	2	1		2	3					1	1		1		2						2			3	1	1					1			25
																																																			0
Maharashtra	Kolhapur		1	1				1	3	1		2		3	2	2	2	1	3	3	2	2	1	2		3	2	2	2	3	2	3	3				3	2	2		1	3	1								64
	Sangli	2	3	3				2	1					2	1	2	1	3	3	2	2	2	1			3				2		2	2	3	2	1			1	1	2	1	3	1	3			3	3		63
	Satara	2	2	3	-1				3			1		1	1	2	2	1	3	2	1	2	1			3		2		2		2	2	1	1	2	1	3	3	3	3	1				3	3		70
	Pune	2	1	3					2			3	3	3	3	3	3	2	3	3	3	3	1	3	3	3	3	3	3	1	3	2	2	2	2	2	3	3	3	2	3	3	1	1		3	3	-1	98
	Solapur	2	3	3					2			2	1	1	2	2		2	3	2	2	2	1			3				3	1	1	3	2	3		3		1		2	3					2	1		58

SUITABILITY MATRIX (LOCATION SUITABILITY ASSESSMENT FOR NODES/MEGA CITIES)- *TOTAL SCORING SHEET*

	PARAMETERS	LAND USE / LAND UTILISATION						ENVIRONMENTAL PARAMETERS				DEMOGRAPHIC INDICATORS				SOCIO ECONOMIC PARAMETERS								INDUSTRIAL SCENARIO				TRANSPORT INFRASTRUCTURE								WATER			POWER		LAND AVAILABILITY					OTHERS	Total (Grading & Weightage Based Scoring)
																ECONOMIC SCENARIO				SOCIAL COMPONENT												Road			Rail				Airport	Port						STATUS OF LAND ACQUISITION* (KIADB, MIDC)			GOVT. LAND HOLDINGS			
State	BMEC Region Core Districts	AGRICULTURE: Double crop & Agricultural plantations	AGRICULTURE: Single crop	WASTE LAND: Waste land, Fallow land & Mining areas	FOREST: Forest Cover	FOREST: Reserved Forest & State Reserved	FOREST: Protected Areas & Wild Life Sanctuaries	Elevation and Slope	HYDROLOGY: River Basins & Perennial River Density	GEOLOGY: Mineral Resources	GEOLOGY: Soil Types	Population	Decadal Growth Rate	Population Density	Urban population Share	GDDP	Secondary Sector share of GDDP	Growth rate of GDDP	Per capita Income	Educational Infrastructure	Proximity to Urban Centres	HDI	Work Force Participation Rate	Non Agricultural Workers	Growth rate of Non Agricultural Workers	Literacy Rate	Employment through Industrial Sector	Presence of Industries	Presence of Large Scale Industries	Proximity to Gas Pipeline	Presence & Proximity to Major NH Intersections/ Junctions	Total Road Density	NH & SH Density	Rail Density/ Index	Rail Freight Terminals	Presence of Rail junctions	Proposed Rail links	Presence & Proximity to Airports	Proximity to Major Ports	Connectivity to Ports	Water Availability	Proximity to Major Surface Water Sources	Ground Water Status	Installed Power Capacity (Conventional Energy Sources)	Installed capacity (Renewable Power Sources)	Total Land under Acquisition Process	Availability of Contiguous Land Parcels	Status of Acquisition (Notified & to be De-Notified)	Total Area of Govt Land Holdings	Availability of Contiguous land parcels > 500 acres	Presence of Heritage Sites	
Karnataka	Chitradurga	2	4	15	0	0	0	0	0	12	2	0	0	0	0	0	3	0	2	0	8	6	9	0	5	6	4	8	0	12	10	0	5	10	8	0	12	3	0	5	4	8	0	0	9	4	0	5	4	5	0	190
	Haveri	1	6	10	0	-1	-1	2	3	4	4	0	0	4	2	0	3	9	4	0	8	3	6	0	5	9	4	4	0	8	0	8	10	5	4	0	4	6	4	10	4	4	4	0	3	4	0	5	0	0	-6	166
	Davengere	1	2	0	0	0	0	0	0	12	2	1	0	4	4	2	6	0	4	3	8	6	3	0	5	9	4	4	0	8	0	0	10	5	8	0	12	3	0	5	12	8	0	0	3	4	0	0	4	5	0	167
	Hubballi- Dharwad	2	4	10	0	0	0	3	0	8	6	1	2	4	6	2	6	0	6	6	8	6	3	8	5	9	12	8	4	12	15	8	15	15	0	9	12	9	12	15	4	8	6	0	0	8	8	0	0	0	0	285
	Ballari	1	2	5	-1	-1	0	0	0	12	4	1	4	4	4	2	9	0	6	3	4	3	6	4	10	3	8	8	12	8	0	0	10	10	12	6	0	9	0	5	8	8	4	4	3	12	12	15	12	15	-6	260
	Belagavi	0	2	0	-1	-1	-1	1	6	4	4	2	2	4	2	4	6	3	4	3	8	6	3	0	5	6	12	12	8	12	10	4	15	5	8	0	0	9	12	15	12	8	2	2	6	8	4	10	8	10	-6	258
	Hassan	2	4	5	0	0	0	0	3	12	2	0	0	2	2	2	0	0	4	9	8	6	9	0	0	9	8	8	0	4	5	4	15	15	0	6	8	9	12	15	12	12	2	0	0	4	0	0	0	0	0	218
	Bagalkot	1	2	0	-1	-1	0	3	9	4	6	0	2	2	4	2	0	6	4	3	4	3	3	0	5	3	4	4	0	8	0	4	15	0	4	0	4	3	0	0	4	12	2	2	3	4	0	0	0	0	-3	134
	Gadag	2	6	15	0	0	0	0	0	8	6	0	0	0	4	0	0	3	4	0	4	6	6	0	0	9	4	4	0	12	0	0	15	5	0	0	4	6	4	10	4	4	0	2	6	0	0	0	0	0	-3	150
	Koppal	2	4	15	0	0	0	0	0	4	4	0	2	2	0	0	0	6	4	3	4	3	6	0	10	3	4	4	0	0	0	4	10	0	4	0	8	6	0	5	4	12	4	2	0	0	0	0	0	0	0	139
	Chikkamagaluru	0	0	0	-1	0	0	0	3	12	2	0	0	0	0	0	0	3	4	3	0	6	9	0	0	0	0	4	0	4	0	8	0	0	0	0	0	0	0	10	0	12	2	2	0	0	0	0	0	5	0	88
Maharashtra	Kolhapur	0	2	5	0	0	0	1	9	4	0	2	0	6	4	4	6	3	6	9	8	6	3	8	0	9	8	8	8	12	10	12	15	0	0	0	0	9	8	10	0	4	6	2	0	0	0	0	0	0	0	207
	Sangli	2	6	15	0	0	0	2	3	0	0	0	0	4	2	4	3	9	6	6	8	6	3	0	0	9	0	0	0	8	0	8	10	15	8	3	0	0	4	5	8	4	6	2	9	0	0	0	12	15	0	205
	Satara	2	4	15	-1	0	0	0	9	0	0	1	0	2	2	4	6	3	6	6	4	6	3	0	0	9	0	8	0	8	0	8	10	5	4	0	8	9	4	10	4	12	6	6	9	12	4	0	12	15	0	235
	Pune	2	2	15	0	0	0	0	6	0	0	3	6	6	6	6	9	6	6	9	12	9	3	12	15	9	12	12	12	4	15	8	10	10	8	9	0	9	12	15	8	12	6	2	3	0	0	0	12	15	-3	333
	Solapur	2	6	15	0	0	0	0	6	0	0	2	2	2	4	4	0	6	6	6	8	6	3	0	0	9	0	0	0	0	15	4	5	15	8	9	0	9	0	5	0	8	6	0	0	0	0	0	8	5	0	184

Suitability Legend

- Best Suitable Grade 1 Districts
- Moderately Suitable Grade 2 Districts
- Suitable Grade 3 Districts
- Least Suitable / Data Not Available/ Not Applicable
- Unfavourable Parameters with negative scoring
- Unfavourable Parameters with negative scoring

Note:

- *Due to lack of data, some of the parameters are not considered as part of this assessment and would be updated as & when the data is made available.*
- *Some information are based on Secondary data and would be updated as per availability of primary data from respective authorized sources*
- *The parameters like landuse/ Land utilization, Land availability etc. are yet to be made available by respective government authorities of GoM & would be updated as per availability*
- *Information on Status of land acquisition is as per data made available from KIADB & W.r.t to Maharashtra Data was available only for 3 districts of namely Kolhapur, Satara and Pune.*
- *** The water availability is scored based on stake holder consultation, subjective analysis of various secondary sources and District perspective plans.*

Based on the computations of the grades of the core districts along with the weightages awarded to the individual sub parameters, the final hierarchy of the core districts based on their suitability to locate industrial nodes are as given below.

Classification of final score computed	Districts	Grade
>=270	**Pune, Dharwad**	**Grade 1**
250 - 270	**Ballari, Belagavi**	**Grade 2**
165 - 250	**Chitradurga, Davanagere, Haveri, Hassan, Kolhapur, Satara, Sangli, Solapur**	**Grade 3**

The grading and scores are interim, not final and are subject to changes. This is due to non-availability of data or non-availability of complete authorised data for some of the parameters, especially in Maharashtra region. In Maharashtra, data is not available for parameters like reserved forests, protected areas etc, which are the significant parameters in determining the suitability of the location of nodes; hence the final scores awarded to the districts within Maharashtra are subject to variations. Satara currently at grade 3 will possibly be upgraded to grade 2 once data for all the parameters are available & consolidated. On the basis of subjective analysis based on various secondary sources and stake holder interactions the grading for the core districts in Maharashtra are assigned, which are subject to variations once all the data related to the individual sub parameters are consolidated. The final grading of the core districts along with identified sub districts are given in the following section.

10.5 Recommendation on Location for potential Nodes/ Mega Cities

Based on the analysis and grading of the core districts within the BMEC region, the locations for potential nodes are identified. The recommendations are at the following levels.

- **Recommendation on the potential core districts and subsequent target sub districts where the potential nodes can be located.**
- **Recommendation on the possible villages where the nodes could be located.**
- **Recommendations for Greenfield and Brownfield nodes**

Based on the suitability matrix analysis, the stake holder interactions and subjective analysis, the potential core districts and the target sub districts where the nodes can to be located are as listed below:

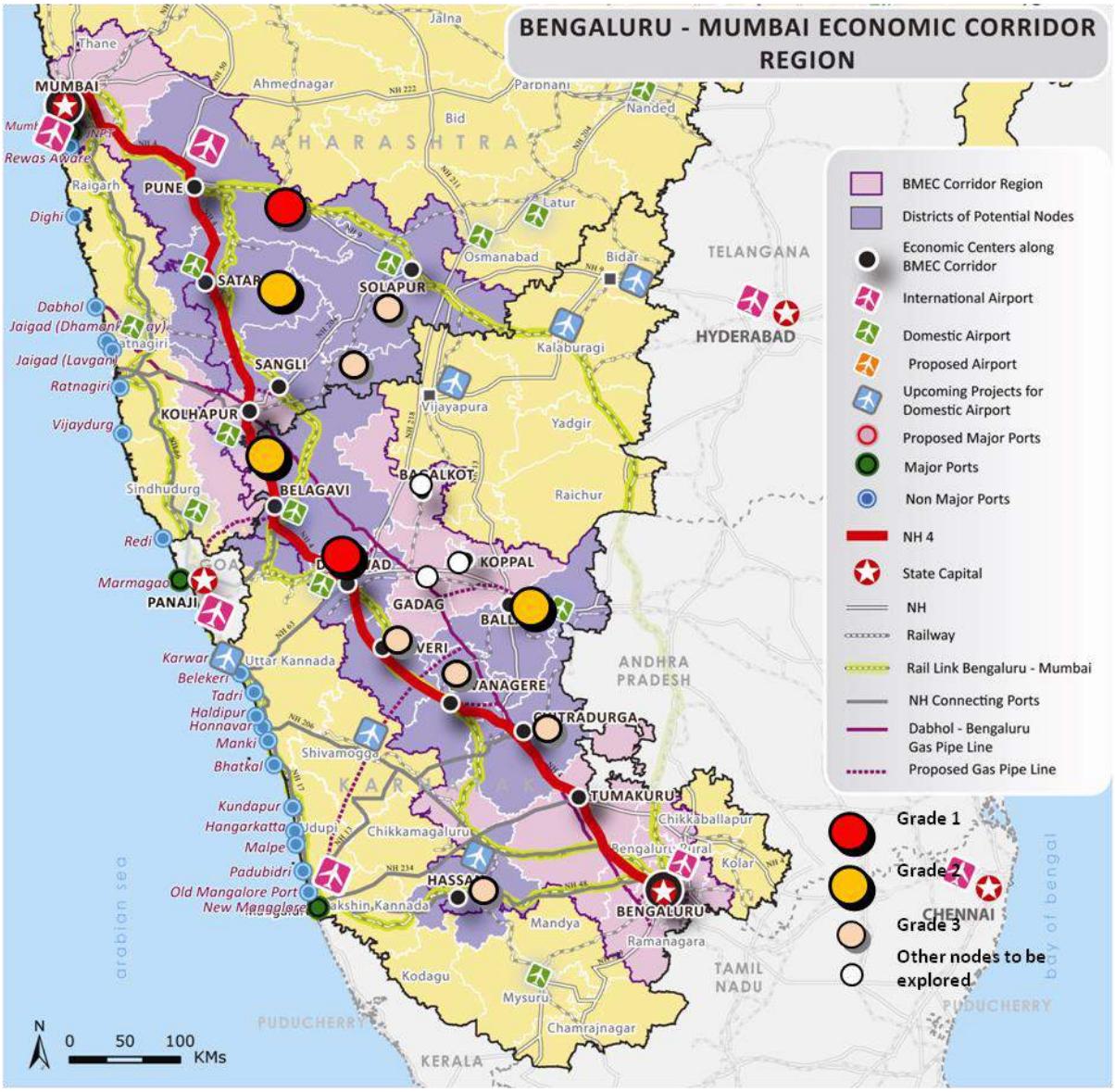
Table: Core districts identified for locating potential nodes

Grade	Core District	Target sub Districts
GRADE 1	**Pune**	Baramati, Daund-Indapur, Bhor
	Dharwad	Hubballi, Dharwad, Khalghati
GRADE 2	**Ballari**	Sandur, Kudligi, Hosapete**, Ballari, Hadagalli
	Belagavi	Hukkeri , Belagavi, Parasgad , Ramdurg, Sampgaon
	Satara	Khatav, Man, Koregaon, Phaltan, Karad
GRADE 3	**Chitradurga**	Challakere, Hiriyur, Holakere
	Haveri	Haveri, Rannibennur, Byadgi, Savanur
	Hassan	Hassan
	Solapur	Mangalvedhe, Sangole, Solapur South
	Davanagere	Channagiri, Harapanahalli
	Sangli	Atpadi, Jat

*NOTE: **From various analyses, Hosapete has emerged as one of thepotential location. The possibility of establishing industrial node in Hosapete is to be reevaluated based on actual site location, as the World Heritage Site Hampi is located within Hosapetee sub district.*

It is to be noted that even though Kolhapur features within the scoring selected for grading, from the analysis and consultation with the concerned authorities of MIDC and DIC it was understood that there is no land available for developing such large industrial nodes/ megacities and hence Kolahpur is excluded in this potential list. Sangli and Solapur are eastern most districts of Maharashtra BMEC regionwith comparatively lesser development than the Western Maharashtra and they are comparatively dry states, locating nodes in these areas would provide impetus to the development in that region of Maharashtra. The sub districts of Pune also selected based on the consultation with the concerned authorities on the possibility of availability of land for node development. Apart from the above listed locations, **Bagalkot, Gadag and Koppal are also identified as possible location for nodes** that could be explored for the location of nodes. The map below illustrates the potential locations of the nodes in terms of the core districts and shows the core districts graded 1, 2 and 3 and the subsequent locations.

Map: Location Suitability Assessment-Identified Suitable Locations for Nodes - BMEC region



Source: Egis

Table: Village wise listing of Potential Node Locations as per Suitability Assessment

Grade	District	Sub district	Village
Grade 1	**Dharwad (Karnataka)**	Dharwad	Chikkamalligwad, Durgadakeri, Kotur
		Hubballi	Hubballi-Dharwad (M Corp.)
		Kalghatgi	Singanahalli
	Pune (Maharashtra)	Baramai	Baramati
		Daund	Kurkumbh
		Indapur	Bhigwan
		Bhor	Bhor
Grade 2	**Belagavi (Karnataka)**	Hukeri	Biranholi, Vantamuri
		Ramdurg	Mudakavi
		Belagavi	Kamakarahatti, Dharanatti, Halabhavi, Machche (CT)

		Parasgad	Hooli
		Sampgaon	Kittur
	Ballari (Karnataka)	Ballari	Veniveerapura, Chaganur, Janikunte, Kudathini
		Hosapete	Danapuram, Gadiganur, Thimmalapura
		Kudligi	Kakkuppi
		Hadagalli	Sogi
		Sandur	Shro.Basapur
	Satara (Maharashtra)	Man, Khatav	Pigli , Gopuj, Nidhal
		Koregan, Phaltan, Karad	Koregan, Phaltan, Karad
Grade 3	**Chitradurga (Karnataka)**	Holalkere	Gunderi Kaval, Kadur Kaval
		Hiriyur	Mavinamadu, Kattehole, Yelladakere
		Challakere	Rangavvanahalli, Badavanahalli Kaval
	Hassan (Karnataka)	Hassan	Doddahonnenahalli
	Haveri (Karnataka)	Haveri	Agadi, Devagiri Yellapur
	Davanagere (Karnataka)	Channagiri	Channagiri (Rural)
		Harapanahalli	Kadathi
	Solapur (Maharashtra)	Mangalvedhe	Mangalvedhe, Mandrup
		Sangole	Sangole
	Sangli (Karnataka)	Atpadi, Jat	Atpadi, Jat

Source: GoK, KIADB, MIDC, Analysis- Egis

Based on the outcome of above-mentioned assessment and grading, the following locations area identified to be developed as industrial nodes under each of the State within BMEC region:

1. **Dharwad** emerges as the priority location for industrial node development in Karnataka part of BMEC, followed by **Belagavi, Ballari, Chitradurga, Hassan & Haveri.**
2. As per preliminary discussion with Government of Karnataka, **location close to & surroundings of existing Belur Industrial area comprising of Chikkamalligwad, Durgadakeri, Kotur of Dharwad sub district along with Kittur villages** of Belagavi district **can be explored to be developed as the priority node in Karnataka**
3. **Pune** emerges as the priority location for industrial node development in Maharashtra part of BMEC followed by **Satara. However, this list is subject to changes based on variation in land availability information.**
4. **Baramati, Kurkumbh, Bhigwan of Pune, Pigli,Gopuj& Nidhal of Satara followed by Mangalvedhe, Mandrup and Snagole of Solapur, Atpadi, Jat of Sangli**are considered as suitable locations for node development based on information available on land availability.

10.6 Recommendations for Greenfield and Brownfield cities/urban centres

As per the various studies and trend analysis, it is expected that by 2041, 65% of the BMEC region will be urbanized. Out of which, it is estimated that around 42% will be accommodated within the existing urban areas and about 58% is to be accommodated in the proposed Greenfield Mega Cities/ new towns[8]. The table below gives the summary of estimations for the Greenfield nodes.

Table: Summary of estimations for Greenfield nodes of BMEC region:

BMEC States with total Urban population (in million)	Population to be accommodated in Greenfield Urban Centers / Mega cities (in millions)	Greenfield Urban Centers / Mega cities
Maharashtra (45.87)	28.92	6-8
Karnataka (33.74)	17.32	4-5

Source: Egis

The locations identified for Industrial Nodes are also indentified as potential locations for the Greenfield cities /urban centres which would either be an independenturban centre located in proximity to the industrial node or an integrated industrial cum mega city .The list of the identified Greenfield cities' locations and the type of envisaged nodes are as given in the table below.

Table: List of Potential Locations for Greenfield Nodes cum Urban Centres

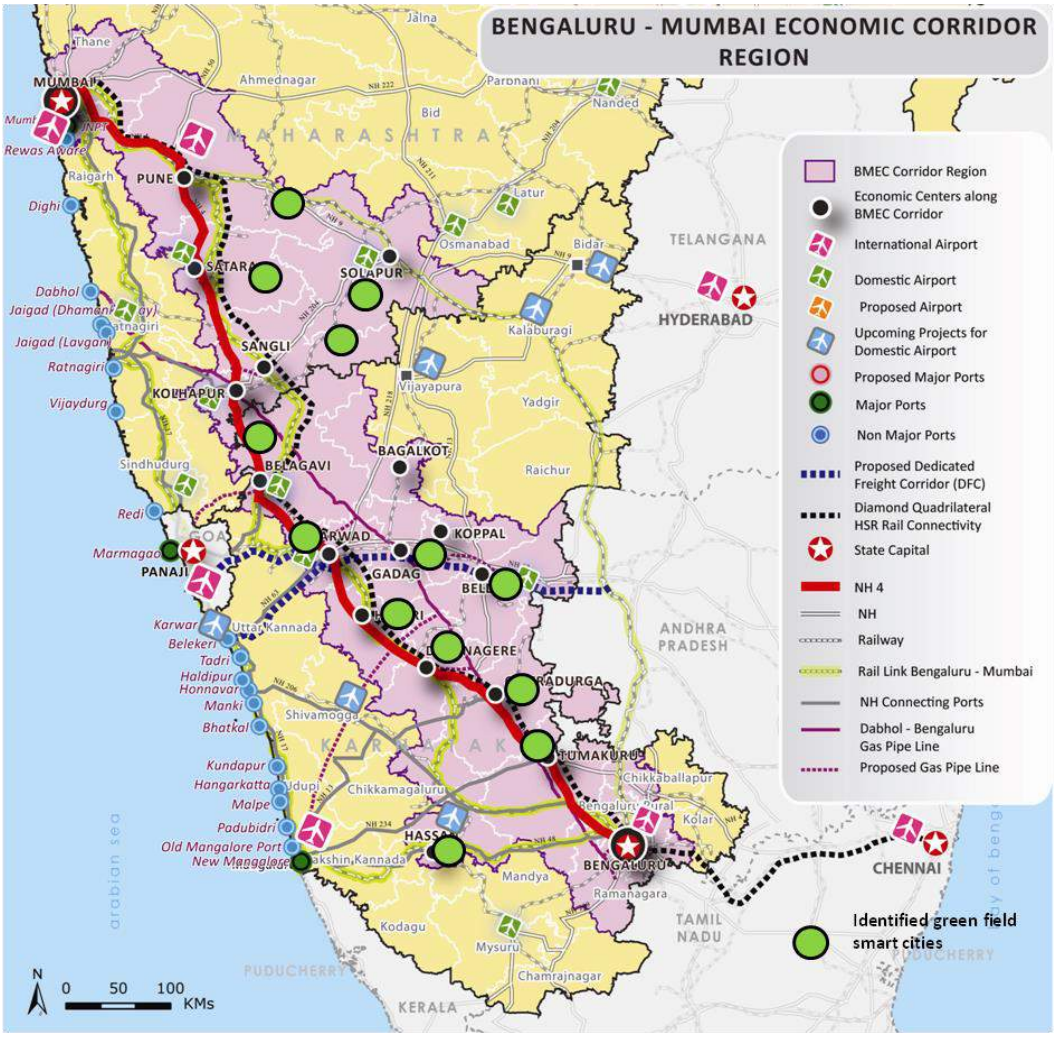
	District	Greenfield Node cum Urban Centers	Type of Node
Karnataka			
1	Dharwad	Hubballi-Dharwad –Kundgol- Kalghati (Belur - Durgadakere)	Mega Industrial Node, Logistic Hub
2	Ballari	Sandur –Kudligi-Hagaribmmanahalli- (Kudutini)	Mega Industrial Node
3	Chitradurga	Challakere – Hiriyur - Holakere	Mega City/ Knowledge Hub
4	Belagavi	Vantamuri-Hukkeri	Industrial Nodes
5	Haveri	Agadi- Boodagatti	
6	Hassan	Hassan	
7	Bagalkot	Bagalkot	
9	Tumakuru	Sira-Gubbi	
10	Gadag	Mundargi	
Maharashtra			
1	Pune	Baramati, Kurkumbh, Bhigwan, Bhor	Mega Industrial Node
2	Solapur	Solapur	Industrial Node cum Logistic hub
3	Satara	Nidhal-Pigli-Gopuj	Industrial Node
4	Sangli	Sangli	

Source: Egis

[8]The projected population share of green field and brown field nodes and existing urban areas are based on the population and subsequent estimations on nodes. The population to be accommodated and the share of urban population are subject to change based on the finalization of the number and size of nodes and the population.

The following map illustrates the location of potential locations for Greenfield Urban Centres

Map: Location of potential Greenfield Nodes cum Urban Centres - BMEC region



Source: Egis

Brownfield Urban Centres:

As discussed earlier, there is a requirement of enhancing the existing urban areas & its infrastructure, as around 42% of the projected urban population is to be accommodated in the existing urban centres/ towns 2041. Hence, these urban centres need to be strengthened to accommodate the projected additional population of BMEC. The potential existing urban centres which are expected to experience rapid growth & needs to be enhanced as Brownfiled urban centers/ cities are identified and the listed here.

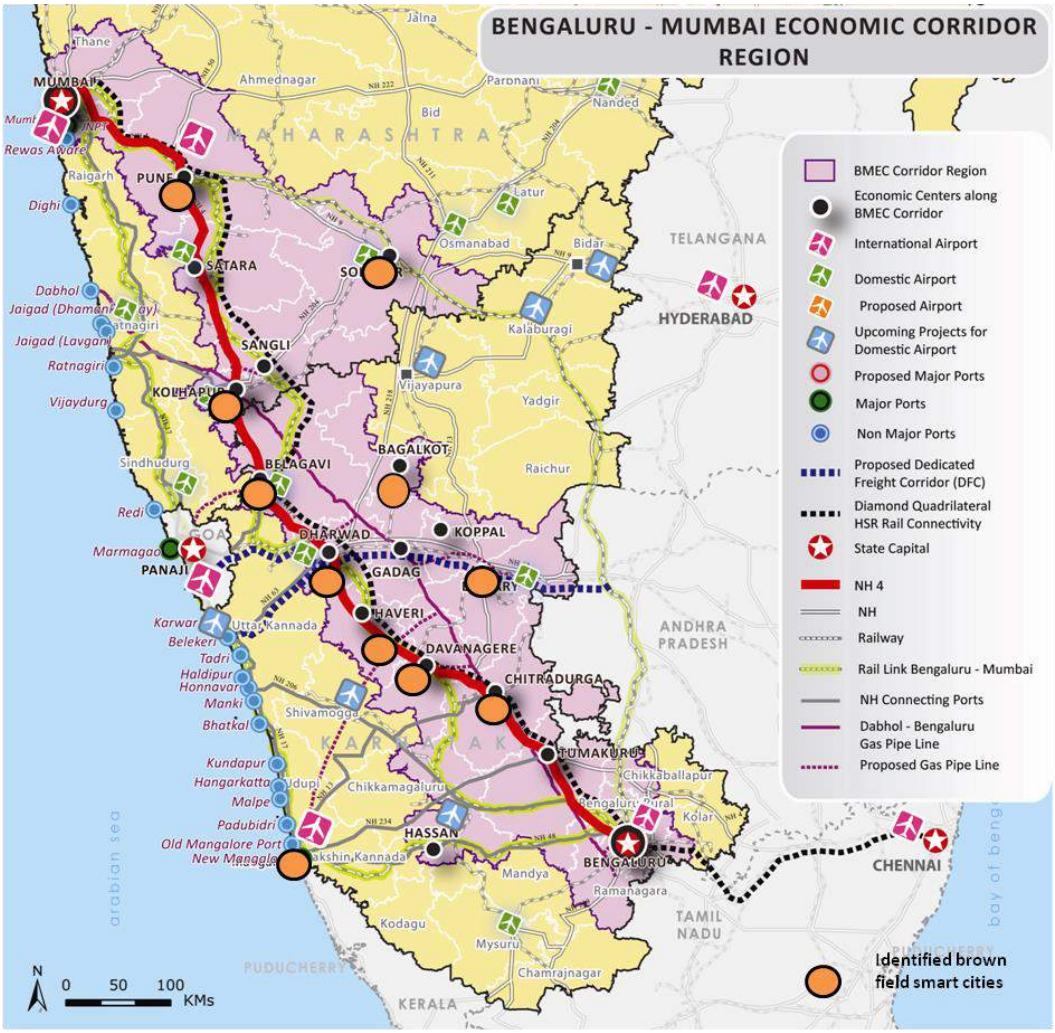
Table: List of identified Brownfield Urban Centres

:		District	Brown field node / Urban Centers
Karnataka			
	1	Dakshin Kannada	Mangaluru
	2	Dharwad	Hubballi-Dharwad
	3	Belagavi	Belagavi city
	4	Ballari	Ballari
	5	Davanagere	Davanagere
	6	Haveri	Ranibennur town
	7	Chitradurga	Chitradurga
	8	Bagalkot	Bagalkot
Maharashtra			
	1	Pune	Pune
	2	Solapur	Solapur town
	3	Kolhapur	Kolhapur town

Source: Egis

The location of these Brownfield nodes is as shown in the map below:

Map: Location of potential Brownfield nodes/ Urban Centres



Source: Egis

There is a need for strategic and sustainable planning of these identified Brownfield nodes to efficiently utilise the resources available in these already highly populated areas and upgrade the existing urban infrastructure of these urban centres.

Smart Cities:

The identified Nodes/ Megacities, Greenfield Cities / Urban Centres & Brownfield Cities are also potential cities to be developed under the Central Government Initiatives to develop 100 Smart Cities across the country. Further, BMEC being envisioned as a green corridor also demands some of the components of Smart Cities, like Smart Energy, Smart Grid, Smart Water, Smart Mobility etc. which insists on efficient & effective usages of resources. The node which would be prioritised from the finalised list of nodes within BMEC for preparation of conceptual master plan as part this perspective plan preparation would also be prepared in compliance with Smart City concepts

10.7 Assessment of Industrial land- Demand and Supply in BMEC region

This section analyses the projected demand of industrial land requirement with land identified or Notified for acquistion or already available with KIADB, GoK & MIDC, GoM and availability of other Government land holdings, toidentify demand-supply gap of land availability within the core districts of BMEC.

The list below summarises the land demand projected up till 2041 at an interval of 5 years and the supply of land available in the core districts.

Table: Suppy Demand gap assessment, BMEC core districts

Core DIstricts	Demand (in km^2)					Supply (in km^2)				Demand- Supply Gap (Excess & Deficit) (in km^2)		
	2016	2021	2026	2031	2036	2041	KIADB/ MIDC land land bank	Govt land - total supply	Govt land above 500 acres	KIADB/ MIDC	Govt land - total supply	Govt land above 500 acres
Bagalkot	0.0	1.0	3.4	7.5	14.6	29.3	14.5	9	0	-15	-20	-29
Belagavi	0.7	6.1	16.2	33.5	62.6	98.9	51.7	584	181	-47	485	82
Ballari	0.0	2.5	8.2	18.0	34.9	70.2	87.7	1,161	135	17	1,091	64
Chikmagalur	0.0	0.5	1.6	3.6	7.1	14.3	6.4	123	35	-8	108	20
Chitradurga	0.0	0.8	2.8	6.3	12.1	24.4	9.9	435	125	-14	411	101
Davanagere	0.1	1.4	3.7	7.6	14.4	22.8	8.9	264	36	-14	241	13
Dharwad	0.3	2.6	7.2	15.0	28.0	44.3	33.9	104	10	-10	60	-34
Gadag	0.0	0.7	2.3	5.2	10.0	20.1	3.5	53	9	-17	33	-12
Hassan	0.0	1.3	4.4	9.8	18.8	37.9	4.5	8	0	-33	-30	-38
Haveri	0.0	0.6	1.8	4.0	7.7	15.6	19.9	31	0	4	16	-16
Koppal	0.0	0.4	1.5	3.2	6.2	12.6	0.6	73	2	-12	60	-10
Kolhapur	0.0	0.9	3.2	7.4	15.2	32.6	0.0	140	6	-33	107	-26
Sangli	0.0	3.7	12.7	29.7	60.6	130.3	0.0	1,495	772	-130	1,365	642
Satara	0.0	0.9	3.2	7.5	15.3	33.1	175.2	1,486	916	142	1,453	883
Solapur	0.0	2.0	7.2	17.0	34.6	74.4	0.0	739	69	-74	664	-5
Pune	0.9	9.5	26.0	57.0	112.6	185.8	0.0	3,285	219	-186	3,100	33
Total	2.0	35.0	105.5	232.3	454.7	846.4	416.6	9,991	2,514	-430	9,145	1,668

Note: The data available on the government land holdings is as per the GIS based mapping carried outon Government land holdingsprovided by Department of Industries,GoK,and as per the Govt. land records provided by Office of Settlement Commisioner,GoMThe KIADB land bank is a summation of all land categorises, including land identified, notified and acquiredand the final land availability information is subject to vary after final confirmation from respective departments.

Source: KIADB, Land Revenue department, GoK, Office of settlement commissioner- GoM, MIDC, Analysis by Crisil & Egis

The above mentioned table illustrates the following;

1. **In case of Karnataka, only Ballari & Haveri districts has sufficient land available under KIADB's land acquisition proposal which would not only supply the projected industrial land demand till 2041, but will have an excess of around 17.45 sqkm & 4.28 sqkm of land respectively.**
2. **Incase of Maharashtra, considering the possible availability of land in Satara district as per the inputs provided by MIDC, the district will have an excess when considering the demand for 2041.**
3. **Considering only the land to be made available through KIADB's proposed acquisition plans, all thedistricts within the Core BMEC region will fall short of the projected industrial land beyond 2031.**
4. **In case of Karnataka, Belagavi districts will have major shortage of land followed by Hassan, Gadag , Chitradurga, Davanagere, Bagalkot. Incase of Maharashtra except for Satara all other districts will have major shortage.**
5. **The Shortage can be fulfilled by considering land available under other Govt land holdings.**
6. **Industrial land demand needs to be meet by assuming the total land available through KIADB's / MIDC's possible availability and total government land holdings available within the district**

A detailed assessment of Demand Vs supply of industrial land of the corridor districts under the following three categorises was carried out:

1. Deficit and excess considering the supply of KIADB& MIDC land
2. Deficit and excess considering the supply of Government land
3. Deficit and excess considering the supply of Government land above 500 acres.

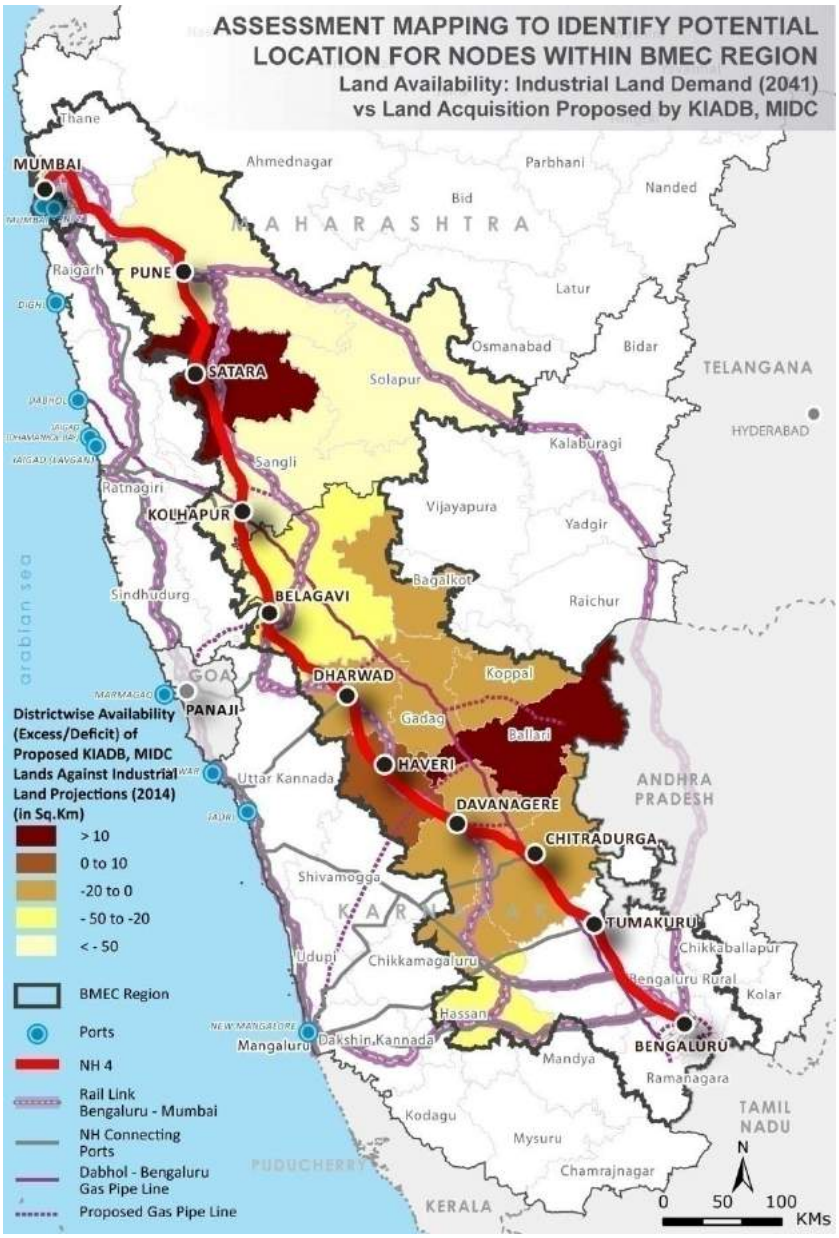
Deficit and excess considering the supply of KIADB& MIDC land:

The total land demand **within core districts by 2041 is 846 sq km**. Total supply of land under KIADB / MIDC, considering land parcels under various stages of notifications, acquisition process or just identified for notification **is only 416.6 sq km. Therefore, there is a demand supply gap of about -429.76 sq km^2 is observed.**

The chart below illustrates the increasing demand of land until 2041, and the subsequent possible supply of the KIADB / MIDC land which are currently under various stages of identification / notification / acquisition process.

By 2036, the demand is expected to exceed the current possible supply of total 416 km^2. The map below shows the district wise excess or deficit of industrial land, considering only land available through KIADB and MIDC's.

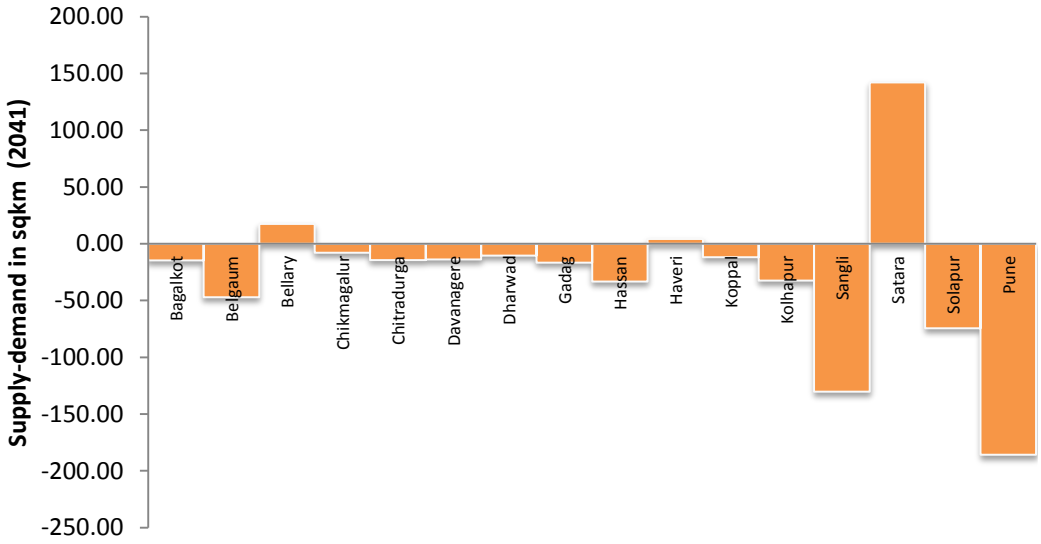
Map: Core district wise excess and deficit of Industrial land by 2041 considering KIADB / MIDC lands



Source: KIADB, MIDC, Mapping and Analysis- Egis

The graph below shows the core districts wise excess and deficit for 2041by considering the current supply of land.

Figure: Supply demand gap as per KIADB/MIDC land availability, 2041



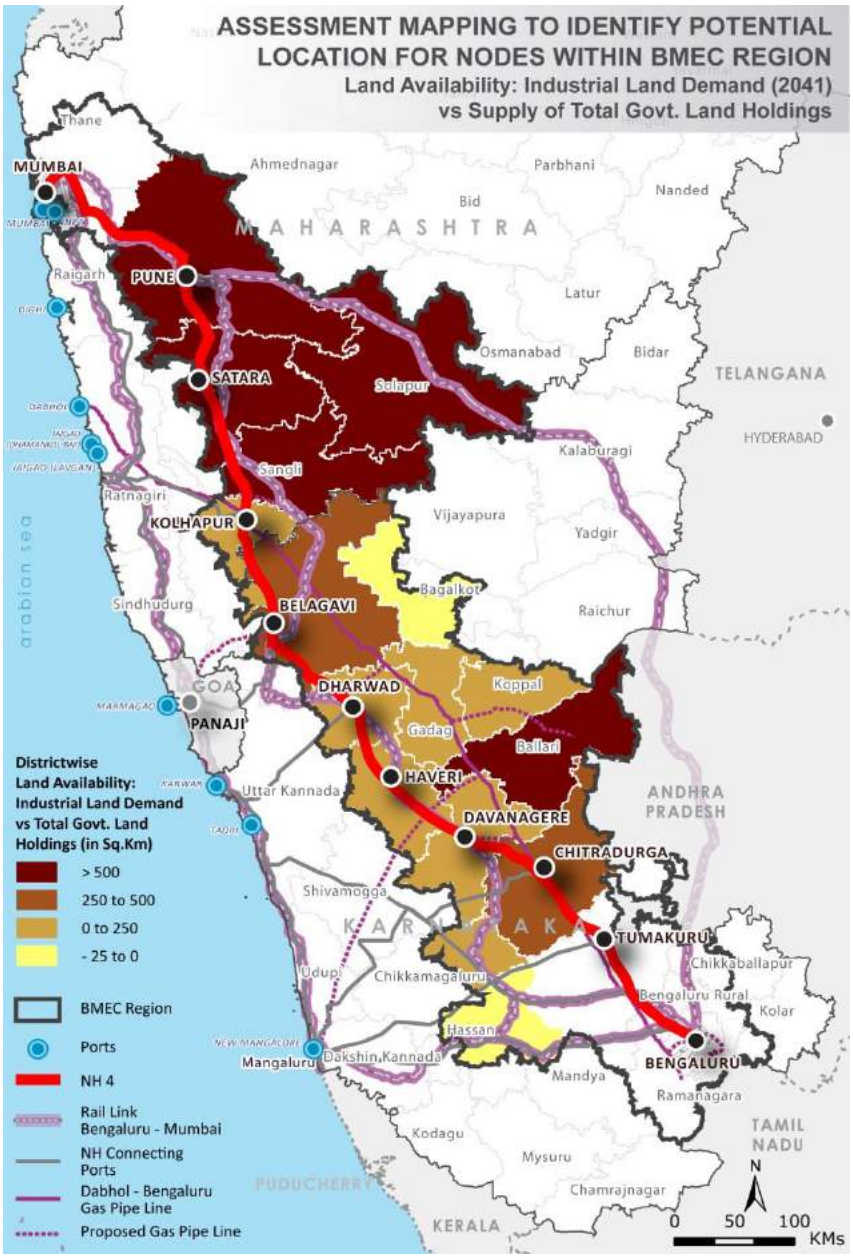
Source: KIADB, Analysis- Egis and Crisil

It is clear from the chart above and the map that, except Satara districtall other districts, fall short drastically, with a shortage of more than 50 sqkm against the estaimted industrialland demand of the respective districts. **Pune district, which is estimated to have the largestindustrial land demand in the Region , has a shortage of more than 185 sqkm of land, which needs to be addressed immediately.In Karnataka region, Belagavi district will have the highest deficit of land of about 47.16 sq km by 2041.As Belagavi is identified as one of the potential node location with secondgrade, it is essential that measures are taken to address this issue.** Except Ballari and Haveri districts, all other districts will have deficit in terms of land supply beyond 2031. It is also clear from the assessment that, the demand exceeds the supply within the next 20 years. For the planned industrial development through BMEC project, land is a deciding and most important resource. It is crucial that the augmentation of land should begin from the initial phase itself as acquiring land in the coming years would be more difficult due to the scaling land prices and demand for land due to increase population. Proper strategising and identification of tools for augmentation and utilization of land for the industrial purpose is very vital and hence is to be initiated along with the first phase.

Deficit and excess considering the supply of Government land:

As supply of land by considering only land under acquisition process by KIADB/MIDC will be deficient to meet the requirement/ demand of land by 2041, hence an analysis considering the total land holdings under Government of Karnataka and Maharashtra is carried out. Based on the analysis, there is an excess of supply of about 9144.56 km^2. The excess / deficit for the core districts are identified and is as mapped below.

Map: Core district wise excess and deficit of land, 2041 considering Government land holdings



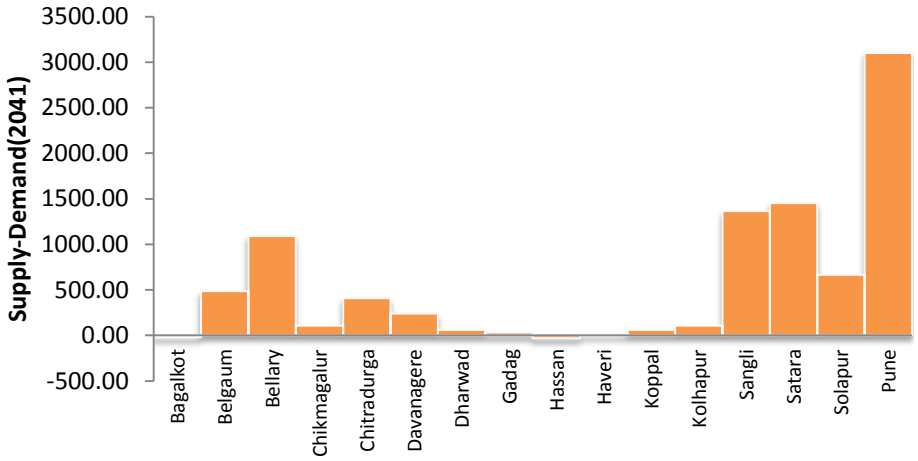
Source: Revenue department, GoK, Mapping and analysis- Egis

(The data is as per the govt. land records. The figures are subject to variation. The data available on the government land holdings as per the government records need to be verified further with District Commissioners of the respective districts, Revenue Department.)

As per this information all districts of Maharashtra have excess Government land holdings which are more than 500 sqkm. Pune district is indicated to have morethan 3000 sqkm of land. In Karnataka, Districts of Hassan and Bagalkot are showing a deficit in this set of analysis with 29.58 km^2 and 19.9 km^2 respectively and rest of the districts have excess of land available. However, in the both the States, the actuall Government land parcesl available for development needs to be verified and confirmed by the revenue department.

The graph below shows the core districts wise excess and deficit for 2041, by considering the current supply of land through Government Land holdings.

Figure: Supply demand gap as per Govt. Land holdings, 2041

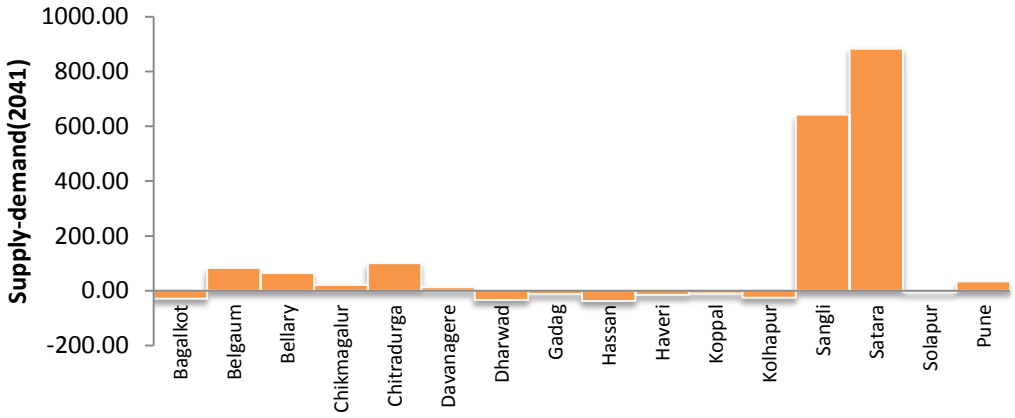


Source: Revenue department, GoK, Office of Settlement Commissioner- GOM, Analysis- Egis and Crisil
(The data is as per the govt. land records. The figures are subject to variation. The data available on the government land holdings as per the government records need to be verified further with District Commissioners of the respective districts, Revenue Department.)

Deficit and excess considering the supply of Government land above 500 acres:

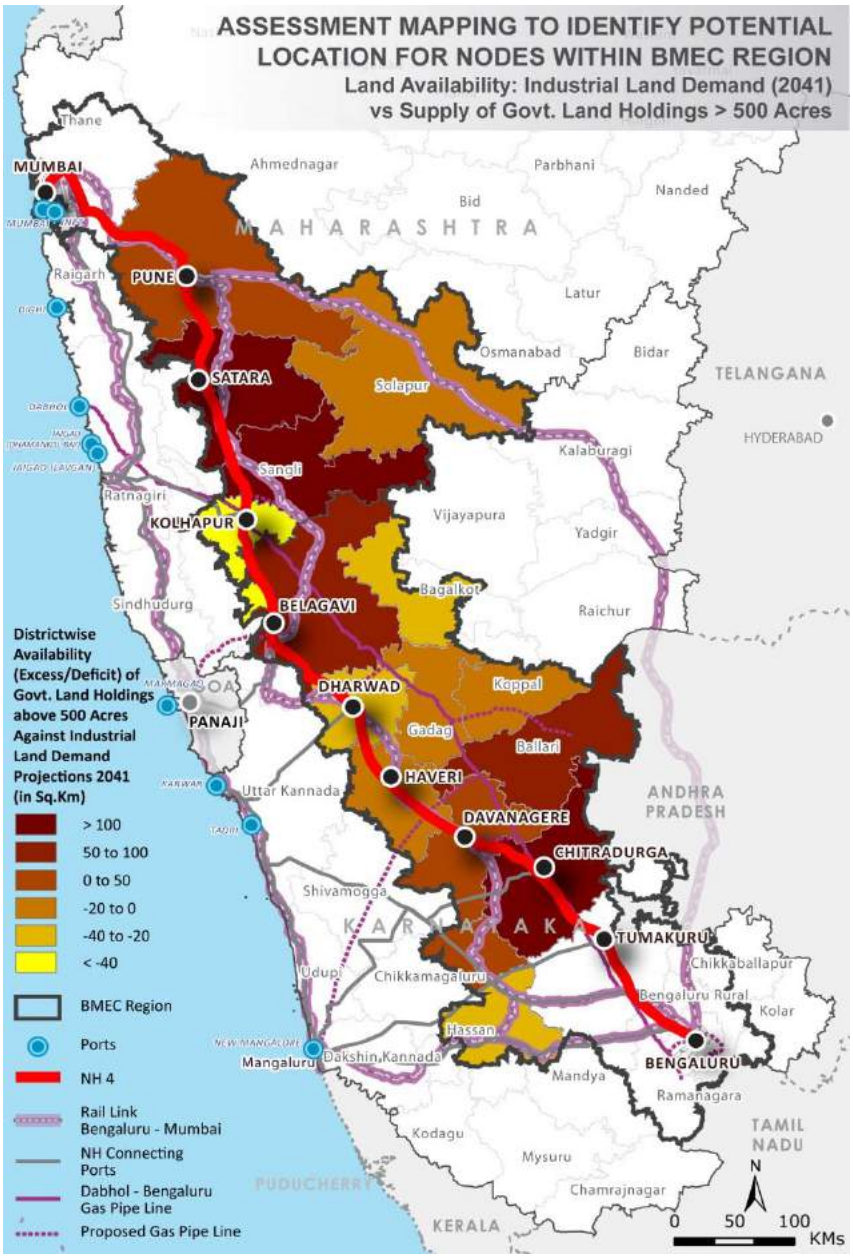
Since the all government land holding may not be available as single land parcel and arespread across the districts under hundreds/ thousands of smaller land parcels which may not be suitable for planned industrial development across the BMEC region, hence, further assessment was carried out by considering only Govt. land parcels with only area above 500 acres. Based on the analysis, about 2514 sqkm is the total supply of such land parcels and would have an excess of around 1667.9 sqkm across the corridor region. The graph below shows the core districts wise excess and deficit for 2041, if we consider the current supply of land.

Figure: Supply demand gap as per Govt. Land holdings>500 acres, 2041



Source: DI & Revenue department, GoK, Office of Settlement Commissioner- GOM, Analysis- Egis and Crisil
(The data is as per the govt. land records. The figures needs to be verified and confirmed by respective Revenue Deaprtment.)

Map: Core district wise excess and deficit of land, 2041 considering Government land holdings>500 acres

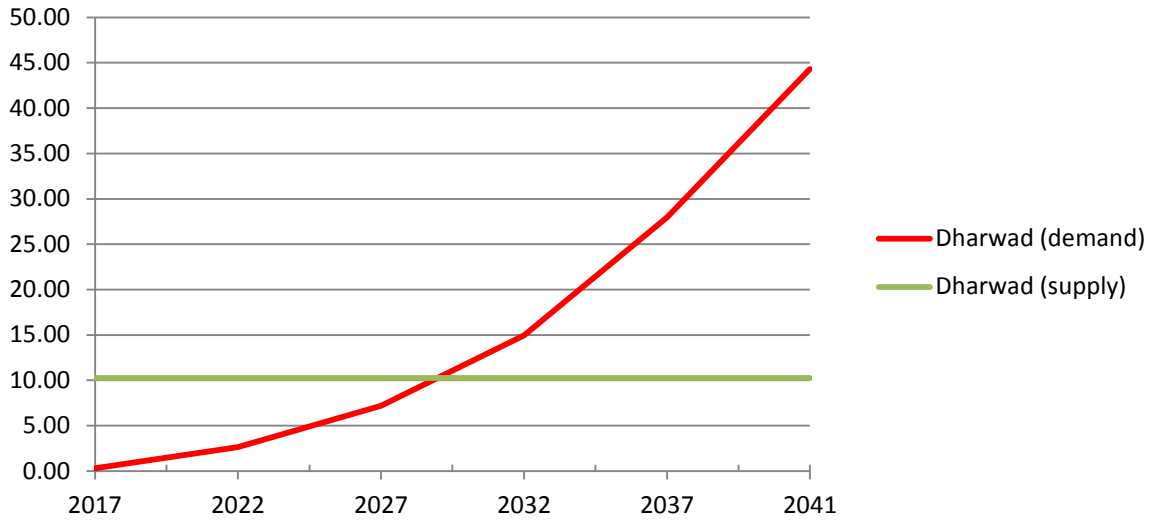


Source: Revenue department, GoK, Mapping and analysis- Egis

(The data is as per the govt. land records. The figures are subject to variation. The data available on the government land holdings as per the government records need to be verified further with District Commissioners of the respective districts, Revenue Department.)

As can be seen from the chart, districts Bagalkot, Dharwad, Gadag, Hassan, Haveri and Koppal, Kolhapur, Solapur are having a deficit of land. Since Dharwad and Pune features in the grade 1 under location suitability for locating industrial nodes,the supply demand gap is charted as given below.

Figure: Supply-demand gap – Dharwad based on govt land holdings above 500 acres

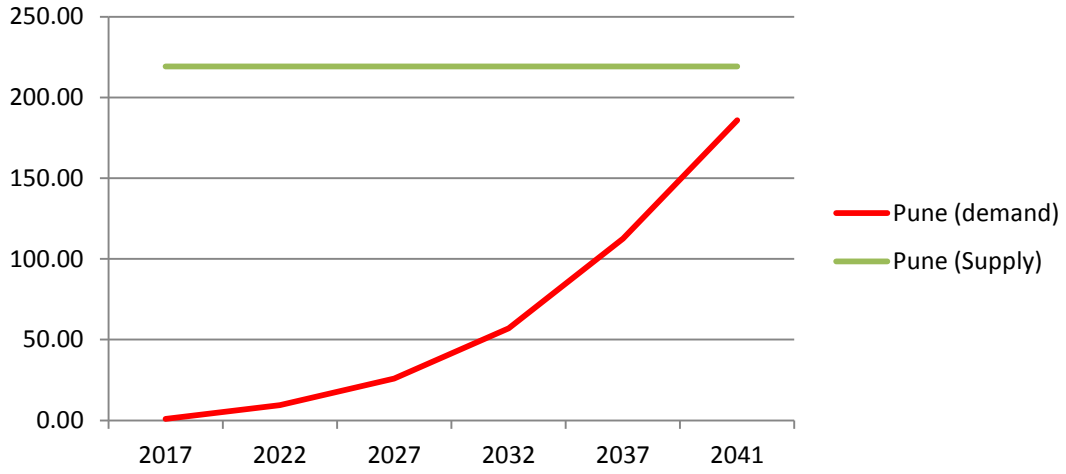


Source: Revenue department, GoK, Analysis- Egis and Crisil

(The data is as per the govt. land records. The figures are subject to variation. The data available on the government land holdings as per the government records need to be verified further with District Commissioners of the respective districts, Revenue Department.)

As per the analysis it is estimated that by 2028, the demand of land exceeds the supply of the government land holdings (above 500 acres) in the case of Dharwad. However, supply through both KIADB's proposed land acquisition planned & available govt. land holding together can minimise the shortage in case of Dharwad.

Figure: Supply-demand gap – Pune based on govt land holdings above 500 acres



In case of Pune, supply of land will be excess till 2041. However this is under the assumption that all these govt. land holdings are actually available for development. This needs to be verified by the respective nodal agencies and the Revenue departments.

From the above set of assessment it can be concluded that, there will be a much predicted gap in the supply and the demand for the industrial land demand, and hence various methods and tools for augmentation of land is to be done from the initial stages itself to address the issue of land demand for industrial development and its realted infrastructure developments.

11. Prioritization of suitable districts for development of Industrial Nodes cum Mega Cities in BMEC Region

This section of the report will explore further to streamline potential districts for the Nodes within identified Districts and Sub Districts, based on various stake holder level interactions, and subjective analysis predominantly based on availability or possibility for availability of land.

Apart from inputs from Location Suitability Assessment & Suitability Matrix, the following are some of the major parameters which were considered in the process of finalising the prominent districts for Industrial Nodes/ mega cities within the identified list of districts:

- **DIPP/DMICDC's recommendation to finalise the location of node within the identified districts, based on availability of minimum of 3000 acres of contiguous land under the ownership of respective State Government**
- **Inputs, suggestions & recommendations, received towards locating the Node from, respective State Governments of Karnataka & Maharashtra, which are the prime stakeholder of BMEC region**
- **Growth & industrial /economical development envisioned for the Corridor region.**
- **Possible availability of land for development in these districts for the location of industrial nodes cum mega cities.**

It is to be noted that this chapter discuss only the prioritisation at the district level. The identification of exact site locations for the development of industrial nodes / mega cities is carried out in the further chapter of this report.

11.1 Prioritising potential districts for locations for nodes in Karnataka region of BMEC

Given below is the list of identified core districts and the subsequent target sub districts for the development of nodes within the Karnataka's BMEC region as per the location suitability assessment carried out in the previous chapter.

Table: List of identified core districts and target sub districts in Karnataka as per the Location Suitability Assessment- Karnataka

	Core District of BMEC	Target sub districts of BMEC
1	Dharwad	Hubballi, Dharwad, Khalghati
2	Ballari	Sandur, Kudligi, Hospet**, Ballari, Hadagalli
3	Belagavi	Hukkeri , Belagavi, Parasgad , Ramdurg, Sampgaon
4	Chitradurga	Challakere, Hiriyur, Holakere
5	Haveri	Haveri, Rannibennur, Byadgi, Savanur
6	Hassan (or)	Hassan
7	Davanagere	Channagiri, Harapanahalli

*NOTE: **From various analyses, Hospete has emerged as a potential location. The possibility of establishing node in Hospet is to be re-evaluated as the World Heritage site Hampi is in Hospete sub district. Apart from the above listed locations, **Bagalkot, Gadag, Koppal are also identified as possible location for nodes** that could be explored for the location of nodes.*

Source: Egis

GoK initiatives towards Identifying Priority Nodes: As per the meeting held under the chairmanship of ACS to Government of Karnataka, Commerce and industries department[9], it was decided that out of the six districts identified within the BMEC region of Karnataka to locate potential nodes, development of 3 nodes were prioritised and the location of these nodes were decided to be finalised based on availability of contiguous land of more than 3000 acres of Govt. land within the 4 districts, namely Belagavi, Dharwad, Chitradurga, Haveri / Davanagere. The prioritisation of the core districts in Karnataka was majorly based on the inputs received from the Government of Karnataka. Given below is the list of core districts prioiritised by GoK from the identified list from the consultants.

Table: List of core districts shortlisted by Government of Karnataka to locate Priority Nodes.

	List of Core districts identified and prioritised by GoK for locating nodes	Potential Target sub districts
1	Belagavi	Hukkeri , Belagavi, Parasgad , Ramdurg, Sampgaon
2	Dharwad	Hubballi, Dharwad, Khalghati
3	Chitradurga	Challakere, Hiriyur, Holakere, Chitradurga
4	Haveri/ Davanagere	Haveri, Rannibennur, Byadgi, Savanur/ Channagiri, Harapanahalli, Jagalur

Source: Proceeding of the Project Review Meeting held on 29.10.2014 under the chairmanship of ACS, C&I, GoK. and Egis Location Suitability Assessment.

Further 4 districts were prioritized which would be considered for phase 1 of implementation and they are,

Table: Prioritised districts considered for Phase I of implementation- Karnataka

	Core district identified for Phase I	Target sub districts identified
1	Dharwad	Hubballi, Dharwad, Khalghati
2	Belagavi	Hukkeri , Belagavi, Parasgad , Ramdurg, Sampgaon
3	Chitradurga	Challakere, Hiriyur, Holakere, Chitradurga
4	Davanagere	Channagiri, Harapanahalli, Jagalur

Major factors favouring the selection of the above districts from the furnished list of core districts suitable for development are as given below:

District prioritised	Factors favouring the selection and prioritisation
Belagavi	• Well-developed industrial base • Skilled man power availability • Power and water issues are not very prevalent • Well established connectivity • Ease in mobilising the land as already large parcels of land are under the process of acquisition by KIADB

[9]As per the proceeding of the Project Review Meeting held on 29.10.2014 at Room no: 123, Vikasa Soudha under the chairmanship of ACS to Government of Karnataka, Commerce and Industries' department

Dharwad	• well-established industrial base with auto ancillary and engineering companies • The twin cities of Hubballi - Dharwad forms one of the largest urban centres of Northern Karnataka and has high possibility of attracting investments and industrial development • Excellent connectivity and well placed urban infrastructure • Ease in mobilising the land as already large parcels of land are under the process of acquisition by KIADB. Existing KIADB estates also attribute to the development of industrial nodes/ mega cities
Chitradurga	• Chitradurga, located at a distance of 200 km from Bengaluru possesses easy connectivity advantage to state capital- Bengaluru. • ISRO, BARC, DRDO and IISC establishments are expected to provide stimulus. • Very high percentage of waste land categories.
Davanagere	• Geographically being the centre point of Karnataka, has the advantage of being well connected to the rest of the State. • Possibility of mobilisation of land

The above listed potential districts which were prioritised for the location of nodes are further analysed in the chapter on site selection to identify the suitable sites for the location of industrial nodes cum mega cities.

11.2 Prioritising potential districts for locations for nodes in Maharashtra region of BMEC

Given below is the **list of identified core districts and the subsequent target sub districts for the development of nodes within the Maharashtra Part of BMEC region as per the Location Suitability Assessment carried out**.

Table: List of identified core districts and target sub districts in Karnataka as per the Location Suitability Assessment - Maharashtra

	Core district identified as per location suitability assessment	Target sub districts identified
1	Pune	Baramati Indapur, Daund, Bhor **
2	Satara	Man, Khatav, Koregaon, Phaltan, Karad
3	Solapur	Mangalvedhe**, Sangole, Solapur South
4	Sangli	Atpadi**, Jat**

Source: MIDC & Department of Industries

*NOTE: **From various subjective analyses, this has emerged as a probable potential location. The possibility of establishing nodes in these locations is to be re-evaluated.*

As per the meeting held with Department of Industries & MIDC, GoM it was decided that out of the districts identified within the BMEC region of Maharashtra to locate potential nodes, development of 3-4 nodes have to be identified at present on a priority basis. **Based on the consultation with the concerned authorities, the area were large parcels of land are identified for industrial development but not yet notified or acquired were taken into consideration for identifying the location of the nodes**. These locations were identified to propel development in the eastern part of Pune, Satara & Sangli districts and in Solapur district.

The identification of potential core districts and Taluks are based on:

- **Location suitability assessment**
- **Possibility of land availability**
- **Inputs provided by Department of Industries & MIDC, GoM**

It is to be noted that Pune and Satara were selected as the priority district out of the 4 potential districts and is considered to be **in the first phase of implementation**. Given below are the district prioritised for the location of nodes in phase 1:

Table: Prioritised districts considered for phase 1 of implementation- Maharashtra

	Core district identified for phase I	Target sub districts identified
1	Pune	Baramati Indapur, Daund, Bhor
2	Satara	Man, Khatav, Koregaon, Phaltan, Karad

Major factors favouring the selection of the above districts from the furnished list of core districts suitable for development are as given below:

District prioritised	Factors favouring the selection and prioritisation
Pune	• Well-developed industrial base • Pune has a well-established supply chain with automobile and engineering companies having vendors within the district • Skilled man power availability • Pune district has the required infrastructure in terms of nearness to port (JNPT), international airport, and other socio-economic infrastructure and well established connectivity • High demand of land from various stake holders for setting up industries within the district owing to the prominence of the district in promoting industrial setups.
Satara	• Geographical proximity to Pune- the most sought out district within the core region for setting up industries. • Excellent connectivity in terms of road and rail • Ease in mobilising the land. • Lesser distance to the ports of Maharashtra on the western coast when compared to the other potential core districts

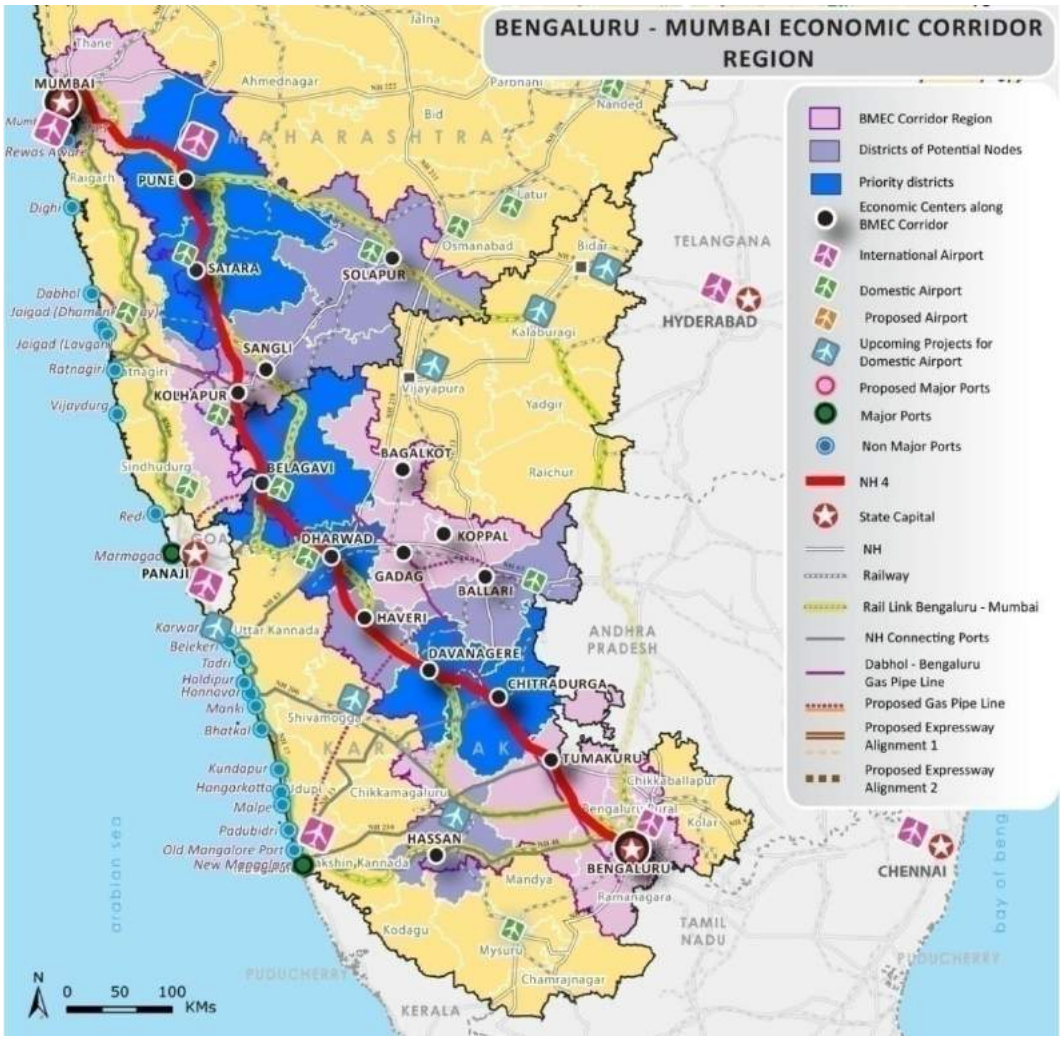
Consolidated priority districts for locating nodes which would come in Phase I of implementation are shortlisted based on the respective state government directives and industrial land development agencies' inputs along with suitability assessment. It is presented in the table below:

Table: Prioritised districts considered for Phase I of implementation- BMEC Region

State	District identified for Phase I	Target sub districts identified
Karnataka	Dharwad	Hubballi, Dharwad, Khalghati
	Belagavi	Hukkeri, Belagavi, Parasgad, Ramdurg, Sampgaon
	Chitradurga	Challakere, Hiriyur, Holakere, Chitradurga
	Davanagere	Channagiri, Harapanahalli, Jagalur
Maharashtra	Pune	Baramati Indapur, Daund, Bhor
	Satara	Man, Khatav, Koregaon, Phaltan, Karad

The map given below indicates the suitable districts which are prioritised for development of Industrial Nodes / Mega Cities in BMEC Region in the first phase of implementation.

Map: Map showing prioritised districts considered for phase 1 of implementation- BMEC Region



Source: Egis, Department of Industries and commerce- GoK & GoM, MIDC

12. Industrial Development Strategies:

Creating an enduring environment for accelerated growth

12.1 Leveraging Existing Environment Enablers

Both Karnataka and Maharashtra state governments have launched industrial policies which aim to focus on manufacturing sector and stimulate investment and employment across the states. The Maharashtra Industrial Policy 2013-18 focuses on increasing the manufacturing sector share to 28% of the state GDP, creation of 2 million jobs and attraction of INR 5 lakh crore by end of policy period. Similarly, Karnataka Industrial Policy 2014-19 aims to enhance contribution of manufacturing sector to state GDP to 20%, generate additional employment for 1.5 million persons and attract investment of INR 5 lakh crores. Skill development is also the focus of both policies. Government of Karnataka had established Karnataka Manufacturing Task Force to recommend strategies to drive manufacturing sector in the state. The manufacturing industries on which special emphasis needs to be laid in the state includes defence and aerospace, automotive, pharmaceuticals, steel, cement, agro and food processing and machine tools sector.

Industrial policy in both the states is also complemented with sector specific policies focusing on textile, agri-business, IT/ITES etc. Maharashtra government has launched New Textile Policy of the state 2011-17 which focuses on attracting investments worth INR 40,000 crores and creation of 1.1 million new jobs by 2017. Similarly, Karnataka government has also launched Nuthana Javali Neethi Karnataka (2013-2018) for the textile sector focusing on attracting investments worth INR 10,000 crores and employment creation of 0.5million new jobs by 2018. In terms of agri business, Maharashtra is in the process of developing Agro-Industrial policy and has placed a draft policy with major focus on integration of modern technology in food processing, encouraging research and development, development of storage facilities for wastage minimization and strengthening the overall supply chain for agro-food produce. Agri Business Policy 2011 by the Karnataka government focuses attention to development of food processing units, employment generation, boosting exports, promoting contract farming, improving overall farm productivity and minimizing post-harvest losses. Karnataka has also launched sector specific aerospace and solar policies with a view to harness the growing potential of these sectors.

Policy developments in both the states is also complemented with infrastructure support in form of Dabhol Gas Pipeline and JNPT fourth container terminal development which is expected to play an important role in promoting EXIM trade in BMEC region.

Maharashtra and Karnataka have initiated various measures to make the process of single window clearance in their states more efficient. Maharashtra has developed an online portal for MAITRI which handles application process for a wide range of approvals. Similarly, Karnataka has developed E-Udyami portal for receiving and processing online applications. Information dissemination is being done through the portal which gives information regarding business procedures and approvals.

Enablers discussed above will play an important role in attracting investments in the corridor region along with other required interventions.

12.2 Enduring Environment for accelerated growth

As per the World Bank's Doing Business Report 2015, India ranks 142nd out of 189 countries, 158th in starting a business and ranks 184 in terms of construction permits.Major bottlenecks faced by the industry include water scarcity, power deficiency, land unavailability, delays in clearances, skilled manpower unavailability etc.These bottlenecks impact bothsmall-medium and large industries, severely impact investor confidence forcing industries to look for sources of business locations. Therefore, policy level interventions both at centre and state level will be required to enhance investment climate in the region to attract companies for investment. Below mentioned table highlights common issues faced by different industries which need attention to stimulate investments.

Figure: Major concerns of Industrial Users

	Small and medium	Large
Onsite		
Access to power and water	✓	✓
Land availability		✓
Access to road/other common infrastructure	✓	✓
Availability of social infrastructure		✓
Availability of working capital finance	✓	
Policy related		
Ease of doing business	✓	✓
Access to markets and technology	✓	
Offsite		
Access to last mile connectivity (Dabhol gas)	✓	
Ineffective port operations	✓	✓
Hinterland connectivity	✓	✓
Support infrastructure (airports, railway lines)	✓	✓
Manpower related		
Skill labour/labour availability	✓	✓
Trade unionism		✓

Source: CRIS analysis

Access to power and water: Water and power supply has been the major concern for several districts in the BMEC region, and industries have not been able to expand further due these problems. These were major concerns highlighted by several companies during primary interactions.

Land availability: Shortage of developable industrial land has been a major hurdle in the expansion of companies in the BMEC region. Farmer unrest has been a major cause of concern for companies with several projects getting stalled due to de-notification of land parcels. Also, high prices of land in certain districts including Pune act as a deterrent for the expansion of industrial activity in the region.

Availability of social infrastructure: Availability of social infrastructure plays a critical role in the case of large companies where movement of mid-level executives is involved. During primary interactions, several corporates highlighted the importance of social infrastructure availability including schools, housing, and recreational facilities and support infrastructure including airports, which facilitates easy executive movement to new districts.

Access to roads/other common infrastructure: Development of internal roads in industrial areas, installation of common effluent treatment plant (CETPs), solid waste management, and connectivity to main highways/expressways are common concerns highlighted by industries, which need government's attention as it impacts the overall attractiveness of industrial areas.

Availability of working capital finance: During primary interactions, it was highlighted that nationalized banks do not offer "industrial financing" branches in certain districts which forces entrepreneurs to move to bigger districts. The MSME sector faces issues with respect to provision of collateral to banks and banking sector also has high risk perception for the sector. Also, MSME players have highlighted the need for working capital support from the government for uninterrupted business operations.

Ease of business: During primary interactions, it was highlighted that delays in getting clearances from different agencies lead to overall delays in project implementation. Even though single-window clearance is present in both the states, the process needs to be made more effective with time-bound approvals. Nodal agencies need to provide faster clearances for ease of business in the region.

Access to markets and technology: MSME industries face issues in expansion beyond the established markets due to limits in budget availability and technological obsolesce. The MSME sector in India has generally been characterized by low technology levels, which creates issues in targeting new markets. Also, raw material procurement is an issue for both small and medium industries with raw material suppliers located far away. However, markets with established players such as Pune have raw material suppliers in the vicinity, leading to smooth operations in the entire value chain.

Access to last mile infrastructure: Last mile connectivity in case of the Dabhol gas pipeline needs to be provided to small and medium scale industries, which face difficulty in bearing the last mile connectivity cost. Large industries can take advantage of last mile connectivity provided by the service provider due to higher volumes; however, smaller users face issues in last mile connectivity, which is currently an expensive option.

Ineffective port operations: Majority of the trade in BMEC region is happening via JNPT with several industries also using Chennai and Cochin ports for operations. The new Mangalore port is currently not being utilized to its full potential for EXIM trade due to lack of mother vessels calling at the port for driving operations. Industrialists face congestions at JNPT and Chennai ports, thereby establishing the need for development of the new Mangalore port to handle Karnataka borne EXIM traffic.

Hinterland connectivity: NH4 is mostly six laned with several patches being still four laned. NH4 needs to be developed as a six-lane highway with proper connectivity from industrial areas/estates to the highway. Proper connectivity needs to be provided from interior roads to NH4.

Support infrastructure: Presence of an airport and railway line connectivity are important considerations for attracting industrial investments. Presence of support infrastructure facilitates easy movement of executives and mid-level management and also plays an important role in attracting labour from other parts of the state.

Skilled labour/labour availability: Industrialists have highlighted the mismatch in skill availability and industry level requirements, which leads to additional investments in training and

developments. Certain players have also highlighted the issue of unwillingness to work by certain workers due to the implementation of the MGNREGA scheme; the scheme entitles reimbursement for unemployed days, which workers find more lucrative.

Trade unionism: Industry players have highlighted the problems related to trade unionism including the "Mathadi Act" in Maharashtra with trade unions disrupting factory operations in case of non-acceptance of demands.

The following table highlights the interventions to be undertaken by the central and state governments to attract investments in the region. Private players also need to partner with the government to facilitate processes in an established manner and take advantage of the available manpower and other resources.

Table: Major Interventions required

Interventions	Central Government	State Government	Private Players
Ease of Doing Business	Quicker approvals from central departments including environmental controls	Provide suitable land for industry development and facilitate faster land acquisition process	Prepare complete documentation as necessary by the system to avoid unnecessary delays
Infrastructure Development	Develop Greenfield ports and introduce dedicated freight corridors within the states	Develop suitable infrastructure in industrial area including proper road connectivity and suitable utility support including water and power	Partner with state government in developing infrastructure in industrial areas on PPP basis
Developing Emerging Sectors	Devise suitable operating framework for upcoming sectors	Introduce subsidy/incentive schemes for attracting private sector to undertake necessary investments	Develop intellectual capital in association with research institutions Focus on cluster development programmes for MSMEs
Skill Development	Formulate skill development policies for emerging sectors	Provide grants for upgradation of laboratory infrastructure at ITI/ITCs	Partner with ITI/ITCs to develop industry specific course curriculum and encourage company specific trainings at ITI/ITCs
Land	Exempt MIDC and KIADB from the purviews of the Land Acquisition and Rehabilitation and Resettlement Act for corridor delineated areas	State may prefer negotiated route for land acquisition which ensures interests of land owners are served well. Private industrial parks may also be promoted by the states. Also, to free up the SEZ land for	-

		industrial development, Maharashtra government announced new measures as per its Industrial Policy, 2013, proposing conversion of de-notified and withdrawn SEZ land into integrated industrial areas (IIA). Under the IIA, 60% of the land will be used for industry, 30% for housing, and the balance 10% for commercial development as compared to SEZs where 50% land is to be developed for industry and remaining 50% for housing etc.	
Support to MSME	Develop transport subsidy provisions for MSME units	Support smaller units in raw material procurement and access to markets	_
Sector Support	Guide State Governments through appropriate policies at Central level and quicker approval of revised state policies	Devise sector specific policies indicating clear objectives and development plans	Partner with Government by showcasing opinions on draft policies

Source: CRIS analysis

Reforms will have to be undertaken in the areas of labour, infrastructure provisioning and policies to attract investments. Below mentioned section highlights certain interventions which can be undertaken as part of the corridor development initiatives.

12.2.1 Strategies for infrastructure development in BMEC region

In terms of external infrastructure, BMEC region will need infrastructure support in terms of Greenfield port and airports development, last mile connectivity infrastructure for gas pipeline, improvement in rail connectivity between Mumbai and Dharwad and development of high speed rail connectivity between Mumbai and Bengaluru. Mangalore port needs impetus towards emerging as an important port in container trade in the region. Connectivity towards port needs to improve with efforts to attract traffic thereby leading to shipping lines improving services to the port. New Greenfield port development in northern Karnataka needs to be fast tracked to promote EXIM trade in the region. New airport development in Pune and Solapur and upgradation of airport in Kolhapur needs to be undertaken for attracting industries in the region. Basic infrastructure provision including water and power supply has been major concern for several districts in the BMEC region and industries have not been able to expand further due to supply issue.

12.2.2 Strategies for creating employment opportunities

Governments in both the states need to policy reforms in terms of labour, infrastructure, skill development and dedicated sector policies to facilitate investment climate in the region. The recent

labour law reform as undertaken by the Rajasthan government by passing the amendments to Industrial Disputes Act increasing the limit on the minimum number of employees to 300 workers, is expected to improve hiring of permanent workers in factories. Haryana government is also planning to pass an amendment on to reform labour laws in the states. Also, the Union Labour ministry has recently proposed the Labour Code on Industrial Relations Bill, 2015, which proposes to combine Industrial Disputes Act, 1947, the Trade Unions Act, 1926, and the Industrial Employment (Standing Orders) Act, 1946. The Bill proposes to allow firms with upto 300 workers to retrench employees with prior permission of the government. Both Karnataka and Maharashtra states need to relook at their current labour policy and initiate reforms as undertaken by Rajasthan government to facilitate investment climate in BMEC districts.

Both Karnataka and Maharashtra states in their respective industrial policies highlight about cluster development approach for enterprise development through resource availability and inherent district strengths. Cluster approach helps in promotion of common interests, skill development, productivity enhancement etc. This cluster development programme needs to be supplemented by "cluster development skill program" where focus clusters need to impart skill development trainings with the help of ITIs, polytechnics, engineering colleges in the vicinity. Skill development programs should be structured in association with industries to arrive at course syllabi with respect to industry requirements. Skill development needs to be enhanced with measures to increase the participation of large industries in the course curriculum development of ITIs located in the district. Also, large and medium industries will play an important role in imparting the required training and enhancing the training infrastructure which will support in hiring of workers from these institutes. Skill development in industrial clusters needs to be promoted with association with research institutions and universities facilitating easy knowledge transfer and access to better technology.

12.2.3 Strategies for land and industrial infrastructure development

Land for industrial development has been a major issue in both the states with private sector highlighting limitations in expansions programs. Reforms in land acquisition acts of respective states needs to be undertaken to facilitate ease of norms for land acquisition without harming the interests of farmers. Karnataka government can look at conversion of de-notified SEZs into development of "integrated industrial areas" (IIA) as undertaken by Maharashtra government. Under the IIA, 60% of the land will be used for industry, 30% for housing and the balance 10% for commercial development as compared to SEZs where 50% land is to be developed for industry and remaining 50% for housing etc. Through IIA, more land will be free up for industrial and commercial development. Development of flatted structures needs to be undertaken to deal with limited land availability. Non-productive industrial plots currently closed due to obsolete technology or non-usage can be converted into multistoried industrial complexes.

12.2.4 Strategies for attracting investments

Major employment generating sectors in the BMEC corridor include textiles, food processing, automobiles and engineering. Hence, these sectors need government interventions and support to remove the existing lacunae. Indian textile industry which plays an important role in the economy contributing about 14% to the industrial production and 12% of merchandise exports has got government support in terms of Technology Upgradation Fund Scheme (TUFS), Scheme for

Integrated Textile Parks (SITP), Mega Cluster, and Integrated Skill Development Scheme (ISDS) to achieve higher growth targets with better technology in place.

Food processing sector has also witnessed government support with schemes implemented for setting up infrastructure for food processing units, funding R&D, providing financial assistance for starting up and reforming food processing units. National Mission on Food Processing (NMFP) was launched by the Central Government in 2012 to help states in building the required infrastructure to ensure efficient supply chain thereby increasing the productivity of the sector. This mission will lead to decentralization of Central Ministry schemes leading to greater participation of state governments in implementation of programs.

Automotive sector contributes approximately 7% to the country's GDP and employs 19 million people. The Government has taken up initiatives to develop state of the art testing and R&D infrastructure with the National Automotive Testing and R&D Infrastructure Project (NATRIP). The Government aims to establish India as an international hub for manufacturing small, affordable cars. The government also aims to assist development of vehicles utilizing alternative sources of energy and steer India's software industry into automotive technology. Electric mobility and manufacturing of electric vehicles is being encouraged by bodies set up by the government namely National Board for Electric Mobility (NBEM) and Nation Council for Electric Mobility (NCEM).

12.2.5 Administration- Ease of Doing Business

DIPP has taken several initiatives to strengthen the overall "Ease of Doing Business" scenario in the country. Some of the initiatives include:

- Launch of e-biz portal", which aims to provide one stop shop for industrial licenses and permits and eliminate the requirement of physical interface with central/state and local government bodies
    - It is expected that all central government services will be made available on e-biz by the end of the year. With the integration of services on the portal, all services will be available 24*7 online including submission of forms, tracking of payments and status etc. Below mentioned are few of the services available online

Ministry/Department Name	Service Name
Ministry of Corporate Affairs	Name Availability
	Director Identification Number
	Certificate of Incorporation
	Commencement of Business
Central Board of Direct Taxes	Issue of Permanent Account Number (PAN)
	Issue of Tax Deduction Account Number (TAN)
Reserve Bank of India	Advanced Foreign Remittance (AFR)
	Foreign Collaboration-General Permission
Employees' Provident Fund Organization	Employer Registration
Petroleum and Explosives Safety	Issue of Explosive License
Directorate General of Foreign Trade	Importer Exporter Code License

Source: "Eleven government services launched on eBiz Portal," PIB, 19 Feb 2015

- "Investor Facilitation Cell" has been established for convenience of investors which provides assistance to investors in the entire lifecycle of the project including policies and incentives prevalent
- Simplification of the filing of applications for Industrial Licence (IL) and Industrial Entrepreneur Memorandum (IEL)
- Process for filing IL and IEL has been made online on the eBiz portal with the portal serving as single-window clearance system for 14 services from various governments and government agencies including Industial Licence (DIPP); Employer Registration with ESIC; Company name availability (MCA); Certificate of company's incorporation etc
- Validity period for industrial license has been extended from two years to three years and Ministry of Home Affairs will grant security clearance on Industrial Licence Applications within 12 weeks
- Defence products list for industrial licensing has been issued and several umber of parts/components, castings/ forgings etc. have been excluded from the purview of industrial licensing. Also, items used for both military and civilian applications have been excluded from requirement of industrial license from defence angle
- Process for obtaining environmental and forest clearance has been made online

Business environment in both the states needs to be improved with focus on single window clearance. Maharashtra has developed an online portal for MAITRI which handles application process for a wide range of approvals. Similarly, Karnataka has developed E-Udyami portal for receiving and processing online applications. Time bound approval process for single window clearance needs to be initiated with provision of granting deemed approvals in case of unexpected delays to facilitate ease of doing business in states. Rajasthan state has adopted time-bound clearance while deemed approvals for clearances may be issued as done in Andhra Pradesh for approvals like permission of gram panchayat, power connection, water connection etc.

12.3 Strategies on optimizing land utilization for industrial node development

Land optimization

Land being a scarce resource in today's world, efficient strategies need to be devised to maximize the use of available land for industrial production. BMEC also faces issues of limited land availability which needs to be efficiently harnessed to maximize the available land availability. Taking example of Singapore, a country having limited land availability, several innovative approaches towards efficient land utilization have been devised including flatted factories, plug and play and cluster industrial complex.

Singapore has initiated development of flatted buildings of as high as eight floors with buildings having common facilities including passenger and cargo lifts, loading and unloading bays etc. In case of plug and play units, industries are offered different types of factory structure including land based, ramp-based and flatted factories, and these are supported by common infrastructure provisions including warehousing, logistics, training facilities, fire stations, worker dormitories etc. Cluster industrial complex includes stacked up factories without ramps where electric overhead

travelling hoisting cranes are installed enabling movement of containers from ground level to different floors of the complex.

Both the states in the BMEC corridor region should facilitate development of flatted factories and plug and play units which will help in optimizing land requirements in the industrial nodes. Industrial Policy of Karnataka (2014-19) mentions liberal floor area ratio for flatted development/ industrial sheds /multi-storied industrial units. Maharashtra Industrial Policy 2013-18 also highlights creation of flatted structures for MSME units for industrial use. Also with the use of advanced robotics and other technologies land requirements in the corridor region can be reduced. Identified sectors in the corridor region including IT, biotechnology, R&D, food processing, textile looms etc. are amenable to flatted industrial development concept.

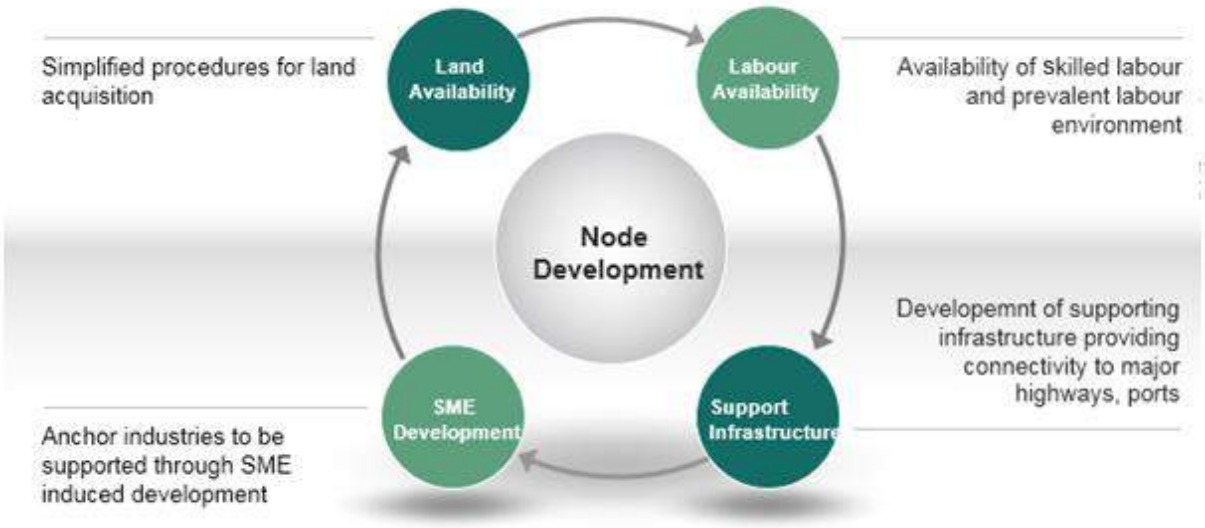
Best practices for minimizing water requirements

With the rapid increase in population and growth of industries in the country, the demand for water has increased drastically leading to increased pressure on water utilities to cater to increasing demands. It is estimated that demand for water by industrial sectors will increase from 6% of total freshwater abstraction by industries in 2010 to 8.5% and 10.1% of the total freshwater abstraction by 2025 and 205014. Therefore, water being a scare resource in the country, effective water conservation measures need to be undertaken in the BMEC region to minimize water related requirements.

Some of the common techniques for water conservation include conservation of water for cooling applications, rain water harvesting, establishment of common effluent treatment plants, installation of water meters to monitor water usage etc. However, installation of other important measures including sensor faucets and showers, water less urinals and dual flush water closet will also play an important role in the BMEC region going forward. Some case studies to illustrate best practices for minimizing water requirements includes Adani Power Limited which at Mundra has adopted water conservation measures including construction of effluent treatment plants (ETP), sewage treatment plant (STP), secondary reverse osmosis (RO) plant and coal run off treatment plant to save approximately 7,84,000 KL of water per annum.

12.4 Strategies to develop Industrial Nodes

BMEC corridor with a vision to promote manufacturing sector will focus on creation of industrial nodes which will encompass world-class manufacturing facilities. Process of development of any Greenfield/Brownfield node will begin with identification of suitable area, followed by land model to be followed for industries. It is essential to develop the following required infrastructure which will play pivotal role in attracting industries to nodes.



Labour availability plays a critical role in development of any industrial node. Interventions in terms of provision of industrial training institutes and other vocational institutes play a critical role in skill development. Prevailing labour environment in the state and more specially the industrial zone is often considered as an important parameter is decision making for establishment of industry. Labour unrest and contract labour issues make it difficult for industries for smooth operations. Also, non-availability of skilled labour forces companies to rely on migrant labour for operations.

Development of **support infrastructure** is basic requirement for any industrial unit which includes provision of basic roads and utilities including water and electricity. Dedicated electricity grids need to be developed with focus on renewable sources of energy including solar and wind energy. Both Karnataka and Maharashtra are blessed with wind and solar power which can be effectively harnessed for catering to energy requirements of industries. Dabhol gas pipeline which passes through 10 districts in Karnataka is currently facing issues with respect to underutilization of the proposed capacity with current utilization being 6-8%. High gas prices and lack of suitable infrastructure for last mile connectivity are major bottlenecks towards gas usage. Also, international airport availability and connectivity to port are also major determinants in developments of nodes. Port connectivity between Bengaluru and Mangaluru port needs to be enhanced with the development of tunnel at Shiradi Ghat section which frequently gets damaged due to heavy rainfall. New Greenfield ports in the state including Karwar and Tadadi port need to be developed to cater to traffic from north and central Karnataka. Railway connectivity to ports and presence of container depots play an important role in EXIM trade.

SME development plays a critical role in development of anchor industries which need raw material support and cluster based developmental approach will be essential in this regard. Development of SME industries with availability of finance provides required impetus to industries.

Share of projected Industrial Land to be accommodated in Nodes: As discussed in the previous sections, the market demand assessment of BMEC's induced scenario has projected an industrial land demand of about 836 km^2 under various Industrial Sectors, which is expected to attract aninvestment of about 114,454 million USD. With an objective of 'Transforming the Region into a Globally Competitive Manufacturing and Investment Destination through Sustainable Development',

majority of these industrial areas will be met through creation of Industrial Nodes/ Hubs cum Megacities at strategic locations along the Corridor Region. These nodes will be developed with world class integrated Industrial infrastructure facilities coupled with green initiatives and sustainable resource management systems which enables manufacturing sector to attract targeted investments in today's highly competitive market. Also, such large scale development assures greater viability due to shared infrastructure such as Water supply, CETPs, Energy practices, ICTs, etc. Hence it's prudent to capture maximum share of estimated Industrial land demand through development Industrial Nodes.

The location suitability assessment has identified ten (10) potential districts (among 16 Core districts) to locate these Industrial Nodes. Therefore, in these ten districts which are expected to have the Industrial nodes, it is assumed that around 80% of the industrial land demand of the district would be accommodated in the proposed Industrial Nodes and the balance 20% will be met through current business model of the agencies involved in industrial development of the respective States & other conventional industrial development practices.

12.5 Strategies to promote sustainable green industrial development

Green industrial development will need concentrated efforts in terms of policy reforms, provision of subsidies, infrastructure and technical assistance. Currently, transportation by road is the preferred mode while railways and coastal shipping are not currently well-developed in the BMEC region. Emphasis should be laid on transportation through railways and coastal shipping for promoting green industry development and decongestion of the already cramped up road sector.Coastal shipping provides several advantages:

- **Environmental and accidental cost**
    - Coastal shipping gains in terms of environmental cost per tonne-km with the cost for coastal shipping amounting to INR 0.030 per tonne-km as compared to INR 0.202 for road and INR 0.05 for rail (diesel traction). Coastal shipping also leads to less emission of carbon dioxide, carbon monoxide, hydrocarbons, etc.

Table: Environmental cost per tonne-km

Mode	Cost
Road (Freight)	INR 0.202
Rail (Diesel Traction)	INR 0.051
Rail (Electric Traction)	INR 0.015
Airways	INR 0.690
Coastal Shipping	INR 0.030

Source: Committee report on standards for coastal & inland vessels; Sea limits for inland vessels; and Incentive scheme for modal shift of cargo from road-rail to waterways, Ministry of Shipping

Table: Accident cost per tonne-km

Mode	Cost
Road	INR 0.062
Rail	INR 0.001

Source: Committee report on standards for coastal & inland vessels; Sea limits for inland vessels; and Incentive scheme for modal shift of cargo from road-rail to waterways, Ministry of Shipping

- **Savings in transportation cost**
  - Fuel consumption during coastal shipping is lesser by 85% as compared to road and 46% as compared to rail.
- **Reduced congestion among freight routes**
  - Major freight routes in the country face congestion, increasing the overall time frame for cargo transportation.
- **Ability to handle large quantity of volumes**
  - Both road and railways face issues due to limited capacity and infrastructure availability. Railways faces issues in non-availability of wagons and congestion at major routes, often leading to preference for passenger trains as compared to freight. Coastal shipping offers advantage in terms of handling large quantities and is averse to congestion.

Coastal shipping gains in terms of environmental cost per tonne-km with the cost for coastal shipping amounting to INR 0.030 per tonne-km as compared to INR 0.202 for road and INR 0.05 for rail (diesel traction). Coastal shipping also leads to less emission of carbon dioxide, carbon monoxide, hydrocarbons, etc.

Supply of energy from renewable sources needs to increase with additional stimulus to development of equipment manufacturing industries. For example, solar PV is one of the emerging sectors which can be developed in the corridor region given solar power potential in the region. However, currently the Indian industry is facing issues with respect to competition from external players which needs government support to create level playing field between domestic and imported items. The overall supply of energy from renewable sources of energy needs to increase with corridor districts having wind and solar energy potential.

Manufacturing processes in industrial areas need to be facilitated with focus on recycling, resuse and redesigning of processing to reduce emissions. Green supply chain in terms of network optimization, green packaging and warehouse layout optimization needs to be undertaken to reduce emissions.

With Dabhol gas pipeline running across several districts of Karnataka, promotion of clean fuel for industrial users needs to be promoted through incentives and subsidies along with provision of last mile connectivity to facilitate adoption of clean fuel.Overall, green industries including the services sector are expected to account for 10% of the total investment in BMEC region, 4% of industrial units, and 5% of the industrial turnover in 2040-41. Green industries along with services sector will have an optimum land requirement and are expected to account for 2% of land in the overall BMEC region. These industries will not have a high employment intensity with catering to only 2% of the overall employment in the region.

Installation of sewage treatment plants and CETPs at industrial clusters becomes an important aspect in promoting waste management. Public Private Partnerships at industrial nodes can be facilitated to run waste treatment plants.

In industrial areas, public transportation needs to be promoted and interventions to promote railways and inland waterways needs to be contemplated. Transportation of freight via rail would need development of freight corridors which will lead to quicker transportation of goods and reducing environmental impact of transportation. “Walk to work” concept across the corridor region

needs to be promoted for reducing the overall emissions. Teleconferencing and efficient use of internet facilities needs to be initiated to reduce overall emissions through transportation.

12.6 Strategies for attracting Global Investment and Establishing BMEC as Global Industrial Investment Region

BMEC corridor with a vision for value addition, sustainability and inclusiveness will focus on attracting investments towards building world-class corridor. As discussed earlier, initial focus will be on development of Hubballi-Dharwad and Pune nodes which are expected to spearhead the corridor development in both the states.

Initially, project notes and concept notes for industrial developments in these two nodes will be prepared in the subsequent module, identifying the emerging sectors which are expected to be part of the respective nodes. Also, targeted infrastructure developments planned and implemented by the government in the corridor area including Dabhol gas pipeline, development of new ports etc will be highlighted. Dedicated website for the corridor highlighting the nodes and expected next generation industrial sectors will be developed and presentations will be highlighted across various industrial forums, trade bodies and investor presentations. Write-ups will be presented in “Doing Business” forums for promotion of the corridor linking two major cities of the country. Moreover, targeted measures including road shows, paper based media interventions as well as electronic media interventions will be undertaken to reach out to industrial players highlighting the potential opportunity at these nodes.

Planned and under development infrastructure interventions from the government are bound to provide comfort to private investors and facilitate the investment process. BMEC positioning will be designed viz-a-viz development of other industrial corridors currently under development in the country. Primary interactions will be undertaken as part of the broad level marketing strategy to understand the views of the industry on product offering and positioning.

These measures covered in detail in the subsequent module of Perspective Plan are expected generate greater interest and excitement among investors on the 1,000 km corridor expected to provide greater stimulus to both the states.

13. Preliminary Infrastructure Perspectives

13.1Transport Perspective

13.1.1 Objective of Transport Perspective for BMEC

Bengaluru Mumbai Economic corridor (BMEC) region & its proposed development, is expected boost the growth in both the states. To achieve the targeted growth discussed in the earlier sections of this report and sustain the growth for long term, strong transport infrastructure, emphasizing connectivity to growth centres, manufacturing hubs of the region, Ports of the region, connectivity to the upcoming SEZs, industrial estates and industrial parks etc., enhancing global trade through enhancement of Port infrastructure & enhancing the logistic infrastructure of the region are vital component of Transport Perspective. The objective of transport perspective would also focus on adhering to the overall Vision of BMEC developing a Competitive & Stainable, Global Investment Region, through proposals to have high speed transport connectivity at possible locations.

Main objectives of the Transport perspective are:

- To establish & enhance the transport infrastructure of the region to global standards over a period of 25 years, which would establish BMEC as an International Industrial Investment Hub
- Strengthen the rail infrastructure of the region through freight corridors, double lining & electrification
- Evolve long term perspective to develop High Speed Transport Corridors across the region through Rail & Road
- Establish effective, efficient & environment friendly port connectivity to BMEC region across Western Ghats
- Enhance Port & Maritime Infrastructure of the region to Global Standards by planning Mega Ports & Transhipment Hubs
- Planning an integrated Road-Rail network across the region inter connecting the Industrial Nodes, Urban Centres, Logistic Hubs & Ports, through strengthening of existing transport links

13.2 ROADS

13.2.1 Existing Scenario- Road Infrastructure: Highlights

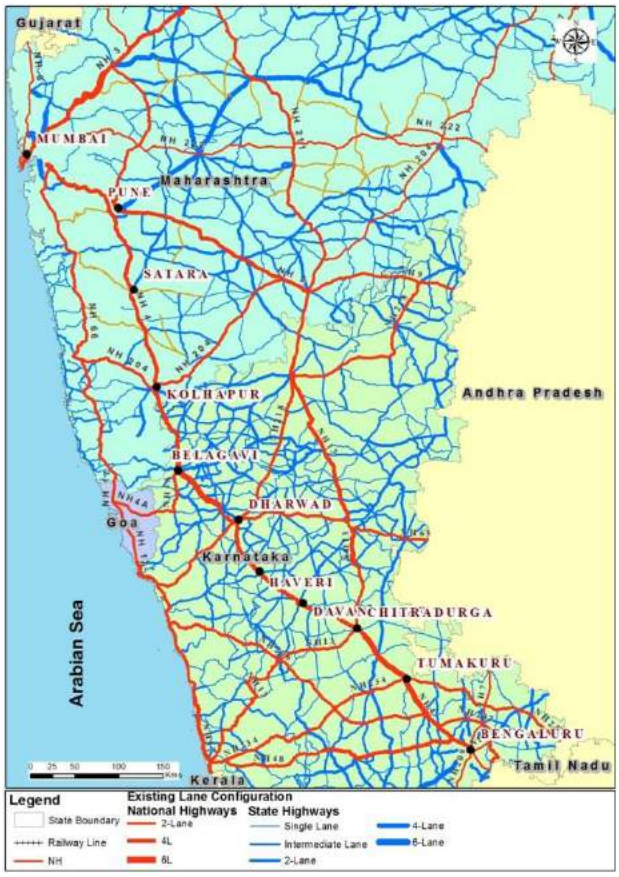
Existing scenario of Road Infrastructure within BMEC influence States:

- **The total road length in Maharashtra as on March 2011 was 4.11 lakh km. Out of this, 1.02% are National Highways, 8.0% are State Highways, 48.9% are other PWD roads, 29.5% are Rural Roads and 12.6% are other roads**.
- **The increase in road length compared to the year 2010 was 3861 km which is around 0.95%, whereas total number of motor vehicles registered in Maharashtra as on March 2010 was 1,57,68,421 and have increased to 1,74,34,099 as on March 2011 at 11% CAGR.**

- **The total road length in Karnataka as on March 2011 was 2.81 lakh km. Out of this, 1.6% are National Highways, 7.4% are State Highways, 17.7% are other PWD roads, 56.2% are Rural Roads and 17.1% are other roads**.
- The increase in road length compared to the **year 2010 was 1,626 km which is around 0.6%, whereas total number of motor vehicles registered in Karnataka as on March 2010 was 89,40,051 and have increased to 98,19,577 as on March 2011 at 10% CAGR.**
- **The Road index of Karnataka is around 146.92 km/ 100 sqkm & is slightly higher than national index of 142.68 km/100 sqkm. Maharashtra is below the national index at 133.41km/sqkm.**

Key facts of road infrastructure in Maharashtra and Karnataka are presented in table below and the map below illustrates the major national & state highways of the States.

Map: Existing Scenario of NH and SH



	Maharashtra	Karnataka
Road length per 100 Sq.kms*	133.41 km	146.92 km
India Road length per 100 Sq.kms*	142.68 km	142.68 km
Surfaced Roads	3,39,794 km (83%)	1,79,099 km (64%)
Un-surfaced Roads	70,727 km (17%)	1,02,674 km (36%)

Source: Basic Road Statistics of India 2008-09, 2009-10 & 2010-11, MORTH, As on 31st Mar 2011

13.2.2 Forecasts and Need for Enhancement of Road Infrastructure for BMEC Area

Traffic Growth Rates:

Bengaluru Mumbai Economic Corridor (BMEC) is proposed to traverse in the states of Karnataka and Maharashtra. Within the context of socio-economic analysis, "broad" and "immediate" influence areas of the project road are delineated, distinguishing the areas directly served by BMEC. Since the passenger and commercial traffic on the project corridor is majorly influenced by the traffic coming from Karnataka and Maharashtra, the broad influence area is considered to cover major part of Karnataka and Pune, Konkan & part of Sholapur sub divisions of Maharashtra (PIA).

Elasticity Approach: Elasticity method of traffic forecast is used for estimating the traffic growth rates for the project influence area (PIA) states Karnataka and Maharashtra. The recommended traffic growth rates are presented in table below for both the states.

Table: Traffic Growth Rates – Karnataka

Mode	2015-16	2017-20	2020-25	>2025
Two Wheelers	6.4	9.1	9.7	8.7
Auto	2.9	2.4	1.9	1.9
CJV	4.9	6.9	7.4	6.6
Bus	4.7	4.6	4.5	4.5
LCV	5.0	6.2	6.4	5.8
TRUCKS	5.2	6.5	6.7	6.1

Table: Traffic Growth Rates – Maharashtra

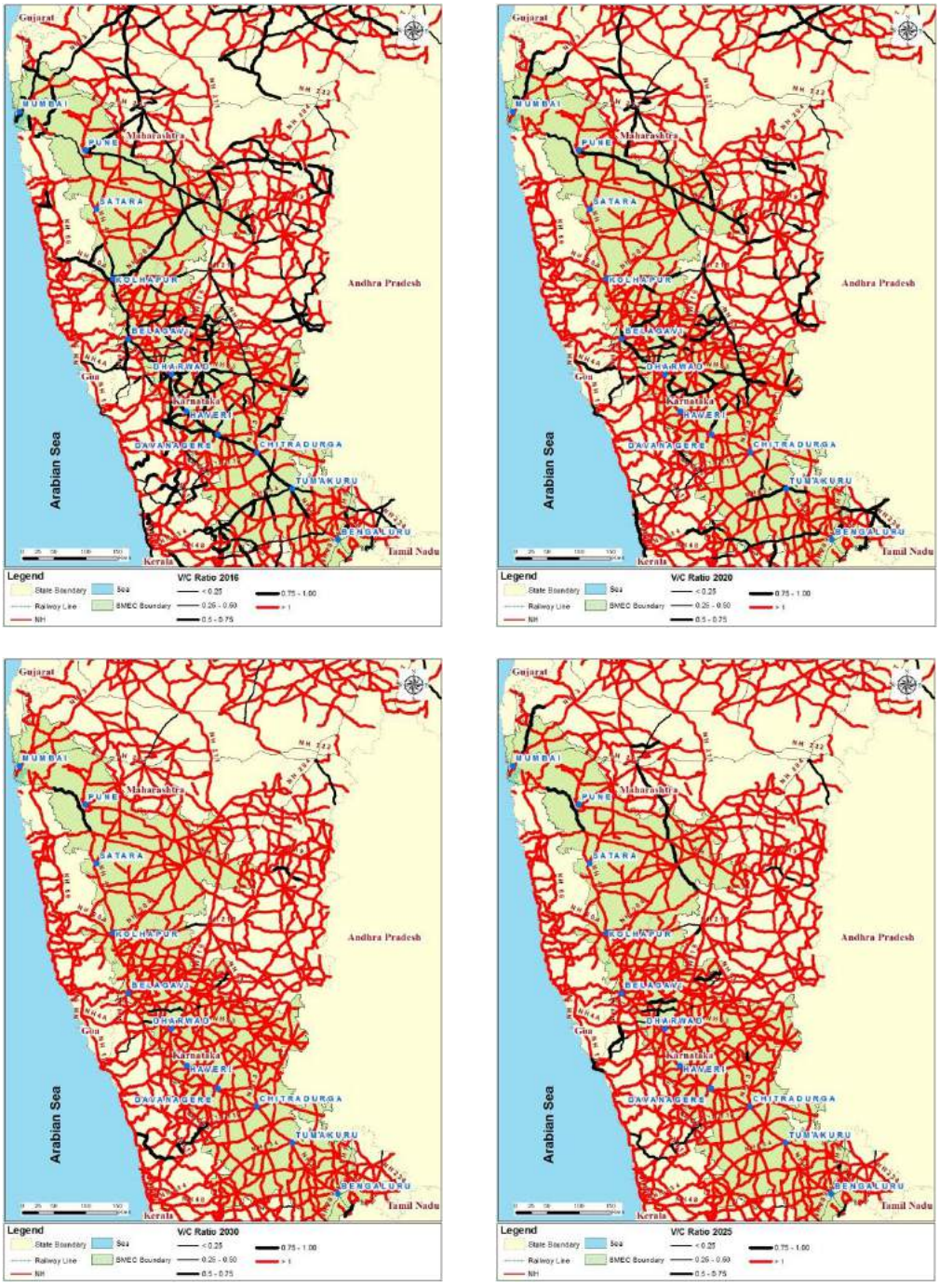
Mode	2015-16	2017-20	2020-25	>2025
Two Wheelers	5.5	7.6	8.2	7.4
Auto	2.6	2.5	2.0	2.0
CJV	5.7	7.9	8.4	7.6
Bus	4.5	4.5	4.5	4.5
LCV	6.4	8.0	8.2	7.4
TRUCKS	6.6	8.3	8.6	7.7

Traffic generated from new on-going, upcoming and proposed industrial developments is considered as 2% additional growth rate to that of the estimated growth rates for the road sections (NH/SH/MDR) which are mentioned as the direct connectivity to the ports, airports and economic centres/potential nodes. **Also additional 1% growth is considered for the rest of the roads within influence area of BMEC region.** The traffic data collected from NHAI and PWD is used for traffic forecast analysis.

Volume- Capacity Ratio Analysis (V/C Analysis): For the purpose of V/C analysis the capacity of the rural roads in the BMEC region is considered as per the Guidelines for Capacity of Roads in Rural Areas **IRC: 64-1990** and **IRC-SP 84-2009**for level of service B (LOS B)**.** Based on the projected traffic volumes of all the existing roads as per their existing capacities, a Volume Vs Capacity analysis was carried out and mapped to understand the roads which will have traffic volumes beyond its capacity limits. i.e. the outcome of the analysis would identify the roads which needs up-gradation in terms

of capacity over a period of time based on projected traffic volumes. Generally, roads with V/C ratio of more than 1 are considered to be serving traffic volumes beyond its design capacity limits. The maps illustrating the V/C ratio for the roads within influence area for a period of every 5 years is presented shown below. The road with V/C ration of more than 1 is illustrated with red colour in the map, the roads with traffic volumes within its design capacity are indicated in black and the intensity of traffic volumes for the same is illustrated with varying line thicknesses.

Map: Traffic Utilization Levels of BMEC Road Network of 2017, 2022, 2027, 2032, 2037& 2041



As can be seen from results the of traffic forecast and v/c ratios, majority of the BMEC roads are exceeding their design capacity by 2022 and almost all roads would be saturated by 2027. This insists the need for enhancement of road infrastructure for BMEC area.

13.2.3 Identification of Major issues & Bottlenecks

National Highway – 4: Bengaluru to Mumbai

Traffic data on NH-4 collected from NHAI is projected for 25 years based on the estimated growth rates. Section wise Traffic forecast numbers on NH-4 is presented in table below.

Table: Traffic Forecast on NH-4 in PCU

National Highway	Section	Lane Configuration	F.Y 2014	F.Y 2025
NH-4	Neelamangala-Tumakuru	4L	65,062	1,55,033
NH-4	Tumakuru-Chitradurga	6L	47,748	1,13,306
NH-4	Doddasiddanahalli-Hadadi	4L	29,012	68,656
NH-4	Hadadi-Devgiri	4L	30,164	71,814
NH-4	Devgiri-Gabbur	4L	30,445	70,037
NH-4	Hubballi-Dharwad Bypass	2L	30,445	70,037
NH-4	Dharwad-Belagavi	6L	33,366	77,320
NH-4	Belagavi-KA/MH Border	4L	26,118	69,830
NH-4	Satara - Kagal	4L	37,236	62,493
NH-4	Khandala - Satara	4L	37,544	98,747
NH-4	Satara - Pune	4L	53,042	1,01,329

Source: Egis

Highlights of projection for NH4

- **NH-4 is currently a 4/6 lane divided carriageway and is the direct connectivity between Bengaluru and Mumbai. As per IRC-64:1990 capacity of a 4 lane divided carriageway is 40,000 PCUs /day and as per IRC-SP 84-2009 capacity for 6 lane divided carriageway is 60,000 PCUs /day for level of Service 'B'.**

- **The current day traffic (F.Y 2014) in Neelamangala-Tumakuru (4 lane) section and Pune-Satara (4 lane) section of NH-4 has exceed the capacity of 4 lane for LOS B.**
- **As per the traffic forecast all the sections of NH-4 will exceed their capacity by the year 2025**

From the traffic forecast figures it can be concluded that even the **6 lane carriageway of NH-4 wouldn't be sufficient by the year 2025 to handle the traffic which will be generated from the proposed potential nodes of BMEC** and permits for Iron ore mining in Karnataka.

Mangaluru Port Connectivity

There are 3 National Highways which connect NH-4 and Mangaluru port:

1. NH-48 connects Bengaluru-Mangaluru is a 2L/4L stretch which is under implementation to 4 lane.
2. NH-234 is a 2 lane corridor, connects Sira on NH-4 and Mangaluru
3. NH-13 is a 2 lane corridor, connects Chitradurga on NH-4 and Mangaluru

- Traffic that will be generated from Chitradurga and Ballari Potential nodes and destination to Mangaluru port will have to use NH-13. Existing 2 lane facility of NH-13 will not be sufficient to handle this newly generated traffic from economic centres.
- Traffic from Proposed NIMZ near Tumakuru will have to use NH-234 so as to reach Mangaluru. NH-234 is currently 2 lane corridor which needs to be implemented to 4 lane facilities for better means of transportation between the NIMZ Tumakuru and Mangaluru Port.

Connectivity to Honnavar, Haldipur and Tadri Ports and Shivamogga Airport

NH-206 is the direct connectivity to Honnavar Port from Tumakuru on NH-4. Freight traffic from Bengaluru and NIMZ Tumakuru to Honnavar & the proposed ports of Haldipur and Tadri will be using NH-206. NH-206 is currently a 2 lane facility and will not be sufficient to handle the traffic that will be generated from economic centres and potential nodes. Hence expansion and up-gradation of this NH is also very crucial. A new Greenfield airport at Shivamogga is approved by GoI in June 2008 and is under construction. Shivamogga is located along NH-206 and hence passenger traffic will also use this corridor (NH-206) to reach Shivamogga airport.

Connectivity to Belekeri Port

Belekeri port, which is proposed to be expanded & developed as a dedicated Iron Ore handling facility needs to be connected to NH-4 at Haveri via SH-2 and SH-69 which are intermediate lane facility corridors. Hubballi & Haveri is proposed as potential node under BMEC and is also an economic centre would also act as an alternative to NH63 which connects Ballari. Traffic from Haveri to Belekeri is likely to increase in the near years due to growth of industries in the BMEC region and the existing intermediate lane of SH-2 and SH-69 will become inadequate.

Connectivity to Redi Port

Road connecting potential node Belagavi and Redi port is comprised of State Highways SH-134, SH-180/121 and SH-123 which are currently intermediate lane. In the near future the road becomes congested due to upcoming industries in and around Belagavi.

Connectivity to Jaigad Port

National Highway 204, SH-106 & SH-4 connects potential nodes Kolhapur/Sangli and Jaigad port. which are currently 2 lane or intermediate lane. In the near future the road becomes congested due to upcoming industries in and around Kolhapur/Sangli. The other alternate route for reaching Jaigad port from Chiplun is via SH-105 which ends at the bank of Arabian Sea, a bridge is lacking in this area to connect directly to Jaigad port.

Connectivity to Dabhol and Dighi Ports

- Dabhol port is connected to NH-4 via SH-78 and SH-4 which are intermediate lane or 2 lane facility
- Dighi port is connected to NH-4 via SH-70 and SH-99 for which the width of the carriageway varies from single lane to two lane facility.

In the near future the roads mentioned above which are connecting to Dabhol and Dighi ports becomes congested due to upcoming industries in BMEC region.

Western Ghats as Major Physical & Environmental Barrier

Apart from the growing traffic issues, the main constrain & bottle neck of transport infrastructure of the region, would be provision of enhanced accessibility between BMEC region & the ports across the Western Ghats. Addressing this physical & environmental constrain would remain as a major challenge of BMEC's Road & Rail perspectives.

13.2.4 Proposed Road Perspective Plan

Capacity analysis results indicates that some of the existing road transport network connecting the ports, major cities, proposed investment regions and BMEC is not sufficient to cater the growth of traffic demand for the horizon period up-to 2041. In order to meet the traffic demand, road transport network up-gradation and new road proposals were taken up.

Based on the analysis 1410 km length of state highways are recommended for up-gradation in both the states of Karnataka and Maharashtra. The following tables provide the preliminary list of State Highways proposed for enhancement:

Table: List of Karnataka State Highways Recommended for Up-gradation

S.no	Road	Sections	Connectivity	Existing Lanes	Length
1	SH 71 & SH 71E	Tiptur - Hassan	Potential Node Hassan to NH-4 (Hassan-Tiptur-Tumakuru)	IL	53
2	SH-19	Challakere - Ballari	Potential Node Ballari to BMEC Expressway	2L+PS	103
3	SH-1	Thirthahalli - Agumbe	Malpe port to NH-206. NH-206 further connects to NH-4	IL	46
	SH-65	Agumbe - Malpe Port		IL	43
4	SH-2	Haveri - SH-69 (Yekkambi)	NH-4 (Haveri) - Sirsi - Kumta/Belekeri Ports	IL	54
	SH-69	SH-69 (Yekkambi) - NH-17 (Kumta/Belekeri)		IL	73
5	SH-20	Belagavi - Salahalli	Belagavi - BMEC Expressway	2L+PS	80
6	SH-12	Vijayapura - Athani	Vijayapura - BMEC Expressway	2L+PS	74

S.no	Road	Sections	Connectivity	Existing Lanes	Length
Total Cost of Road Improvements in Karnataka State					**526**

Source: Egis

Table: List of Maharashtra State Highways Recommended for Up-gradation

S.no	Road	Sections	Connectivity	Existing Lanes	Length (km)
1	SH-106	Nivali Fata (NH-17) - SH-4 (Undi)	NH-4 (Kolhapur) - via NH-204 - Nivali Fata -Jaigad Port	IL	37
	SH-4	SH-4 (Undi) - Jaigad Port		IL	5.5
2	SH-78	Karad - Chiplun Road	NH-4 to Dabhol Port	2L	90
	SH-78	Chiplun - Modka Agar (SH-4)		IL	42
	SH-4	Modka Agar - Dabhol Port		IL	19
3	SH-70	Shindewadi (NH-4) - Pandharpur Fata	NH-4 to Dighi Port	2L	108
	-	Pandharpur Fata - Gava Tala (SH-99)		IL	14
	SH-99 & MDR	Gava Tala - Dighi port		SL	53
4	MDR	Indapur on NH-66 to Rajapuri (Dighi port)	To Dighi port	IL	47.2
5	SH 105	Sawarde(NH17) to Jaigad Port (SH4)	To Jaigad Port	IL	47
6	SH-58	Satara - Mhaswad	NH-4 (Satara) to BMEC Expressway	IL	83
7	NH-204/SH-3	Kolhapur-Sangli-Kamalapur	NH-4-Sangli-Solapur (Crosses BMEC Expressway near Sangli)	2L	130
		Kamalapur-Sangola		4L	8
		Sangola - Ghatne (NH-9)		2L	70
8	SH-134	Sankeshwar (NH-4) - Tita	NH-17 to Redi Port	IL	63
	SH-180/SH-121	Tita - Sawantwadi		IL	37
	SH-123	Sawantwadi - Redi Port		IL	30
Total Cost of Road Improvements in Maharashtra State					**884**

Source: Egis

Based on the traffic forecast and capacity analysis, 1111 km length of National highwaysunder PWD of Karnataka/Maharashtra for which up-gradation is recommended. The following table provides the preliminary list of National Highways proposed for up-gradation:

Table: List of National Highways Recommended for Up-gradation

	State	NH	Section	Connectivity	Existing Lanes	Length (km)

1	Karnataka	NH-206	Tumakuru - Honnavar	NH-4 (Tumakuru)-Tiptur-Shivamogga-Honnavar Port	2L	373
2	Karnataka	NH-234	Sira - Mangaluru	NH-4 (Sira) - Banavara - Mangaluru Port	2L	288
3	Karnataka	NH-13	Chitradurga - Mangaluru	NH-4 (Chitradurga) - Bhadravati - Mangaluru Port	2L	313
4	Maharashtra	NH-204	Kolhapur - Ratnagiri	NH-4 (Kolhapur) - Sakharpa - Ratnagiri Port	2L	137
Total Length of National Highways (Under PWD) Recommended for Upgradation						**1111**

Source: Egis

National Highways NH-63, NH-17, NH-4A and NH-48: sections which are currently 2 lane facility will also exceed their capacity by the year 2025 as per the traffic forecast estimates. These National highways are under NHAI and are proposed for widening to 4 lane facility by NHAI and the cost for the same is born by NHAI.

Recommendations for Identified Ghat Sections along Cross Road Connecting Ports in BMEC Region

Western Ghat is the major bottleneck for the roads connecting ports and potential nodes of BMEC region which has greater impact on the economy of both the states of Karnataka and Maharashtra. A preliminary study is carried out in broad level for the major identified roads connecting ports and potential nodes. Based on the preliminary study carried out tunnels were recommended at critical ghat sections and for rest of the Ghat sections a detail feasibility study has to be carried out for the options of tunnel or realignment. Identified Ghat sections and recommendations are presented in table below.

Table: Identified Critical Ghat Sections and Recommendations

	Highway No.	Connectivity	Ghat Section	Ghat Length	Recommendation
1	SH-70	NH-4 to Dighi Port	Varandha Ghat	6.1 km	Bored Tunnel
	SH-99		HarkolKond-GoveleKondSection	2.6 km	Options to be Studied in Detail
2	SH-78	NH-4 to Dabhol Port	Ghatmatha	11.5 km	Bored Tunnel
3	NH-204	Kolhapur to Ratnagiri Port	Amba Ghat	11.5 km	Options to be Studied in Detail
4	SH-69	Haveri - Tadri,Honnavar Ports	Kodambale–Balekoppa Section	6.5 km	Options to be Studied in Detail
5	NH-48	Bengaluru - Mangaluru	Shiradi Ghat	46 km	Bored Tunnel+Bridges

Source: Egis

Greenfield Road Proposals: BMEC Expressway

NH-4 (4/6 lane carriageway) is expected to exceed its capacity in future by the year 2025 and a Greenfield alternate road is very much necessary to overcome the traffic congestion problems and to reduce travel time between Bengaluru and Mumbai. Hence, it is proposed to develop an

Expressway parallel to the NH-4 to cater to new generated traffic due to new industrial development proposals.

Considering the environmental issues and problems of Western Ghats and NHAI toll policy a new expressway is proposed at a distance of 75 km East of NH-4 in two phases. Also the proposed expressway alignment is finalized in such a way that it traverses only through the states of Karnataka and Maharashtra. The proposed expressway starts on NH-4 near Tumakuru and ends on NH-9 before the proposed ring road of Pune near Theur, Pune. The total length of the proposed expressway is about 599 km. It is assumed that initially 35% of the through traffic from NH-4 will get diverted to the proposed expressway. The results of the divertible analysis show that nearly 10,000 pcu traffic will come on to the expressway for the year 2025.

Key Parameters of Proposed Expressway

- **Expressway starts from Tumakuru on NH-4 and ends at Pune near Theur on NH-9 before the proposed outer ring road of Pune.**
- **Aligned to serve all proposed Nodes of BMEC region**
- **Total length is approximately 599kilometers**
- **Design Speed – 120 km**
- **6 lane facility**
- **ROW to be procured – 100 m**

A detail Feasibility study needs to be carried out for the proposed expressway between Bengaluru and Mumbai. The expressway is proposed to go in two phases as mentioned below.

Phase I

- The ROW **(100 m)** for 6 lanes will be procured right in the beginning and alignment will be frozen.
- Initially **2+2 lanes** will be developed along with 6 lane formation.
- Phase I construction of expressway is proposed to start by the year 2017 and completes by the year **2022**
- The estimated construction cost of 2+2 lane of 599 km expressway at a rate of 18 crores per km is approximately **10,782 crores (excluding land acquisition cost**).

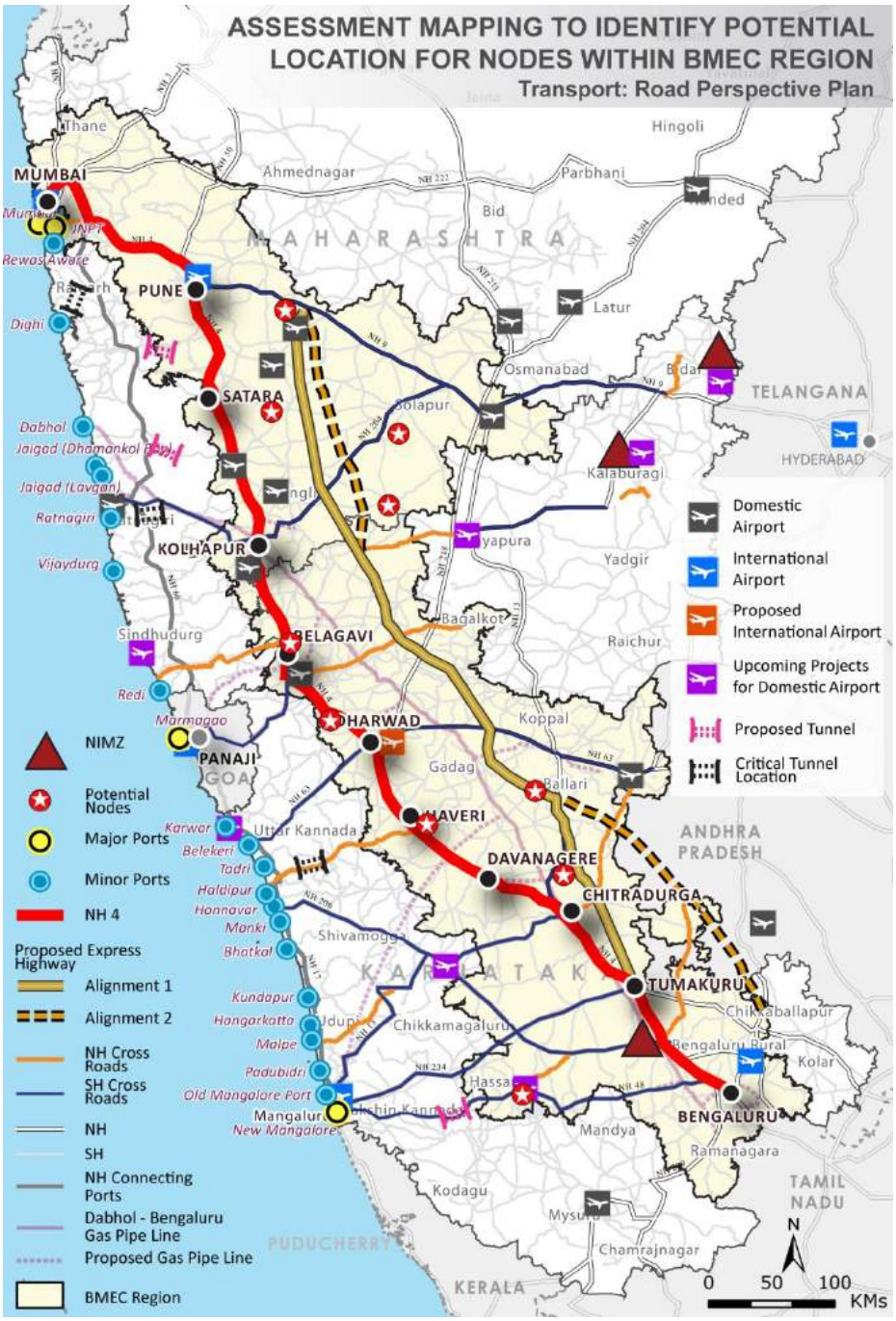
Phase II

- Based on the ramp up of traffic 6 laning will be taken up after **2027**.

The estimated cost of upgradation from 4 lane facility to 6 lane facility of 599 km expressway at a rate of 4.5 crores per km is approximately 2,696 crores (excluding land acquisition cost).

Road perspective plan connecting the ports, proposed expressway and economic centers is presented in figure below and a detailed map covering all the proposed transport perspective components is presented in the Comprehensive Perspective Plan Map of BMEC in subsequent chapter.

Map: Road Perspective Plan



Source: Egis

Detail Phase Wise Costing of Road Perspective Plan

The cost of construction and phase wise implementation of the road network connecting ports with NH-4, Potential nodes and BMEC expressway is summarized in table below. However these are preliminary estimates and are subject to change and the cost per km refers to construction cost and does not include land acquisition cost.

Table: Phasing and Cost of Road Improvements for BMEC in Maharashtra

	Road	Sections	Existing lanes	Proposed Lanes	Length	Cost per km (in Cr)	Total Cost (in Cr)
2017 (Phase 1)							
1	SH-106	Nivali Fata (NH-17) - SH-4 (Undi)	IL	2L+PS	37	5.5	204
	SH-4	SH-4 (Undi) - Jaigad Port	IL	2L+PS	5.5	5.5	30
2	SH-78	Karad - Chiplun Road	2L	-	90	-	-
	SH-78	Chiplun - Modka Agar (SH-4)	IL	2L+PS	42	5.5	231
	SH-4	Modka Agar - Dabhol Port	IL	2L+PS	19	5.5	105
3	SH-70	Shindewadi (NH-4) - Pandharpur Fata	2L	-	108	-	-
	-	Pandharpur Fata - Gava Tala (SH-99)	IL	2L+PS	14	5.5	77
	SH-99 & MDR	Gava Tala - Dighi port	SL	2L+PS	53	8.5	451
4	NH-204	Kolhapur - Ratnagiri	2L	4L	137	9	1233
5	MDR	Indapur on NH-66 to Rajapuri (Dighi port)	IL	2L+PS	47.2	5.5	260
6	SH 105	Sawarde(NH17) to Jaigad Port	IL	2L+PS	47	5.5	259
Total Cost of Phase 1							**2,850**
2022 (Phase 2)							
1	SH-106	Nivali Fata (NH-17) - SH-4 (Undi)	2L+PS	4L	37	6.5	241
	SH-4	SH-4 (Undi) - Jaigad Port	2L+PS	4L	5.5	6.5	36
2	SH-78	Karad - Chiplun Road	2L	4L	90	9	810
	SH-78	Chiplun - Modka Agar (SH-4)	2L+PS	4L	42	6.5	273
	SH-4	Modka Agar - Dabhol Port	2L+PS	4L	19	6.5	124
3	SH-70	Shindewadi (NH-4) - Pandharpur Fata	2L	4L	108	9	972
	-	Pandharpur Fata - Gava Tala (SH-99)	2L+PS	4L	14	6.5	91
	SH-99 & MDR	Gava Tala - Dighi port	2L+PS	4L	53	6.5	345
4	MDR	Indapur on NH-66 to Rajapuri (Dighi port)	2L+PS	4L	47.2	6.5	307
5	SH 105	Sawarde(NH17) to Jaigad Port (SH4)	2L+PS	4L	47	6.5	306
6	SH-58	Satara - Mhaswad	IL	2L+PS	83	5.5	457
7	NH-204/SH-3	Kolhapur-Sangli-Kamalapur	2L	4L	130	9	1170
		Kamalapur-Sangola	4L	-	8	-	-
		Sangola - Ghatne (NH-9)	2L	4L	70	9	630
8	SH-134	Sankeshwar (NH-4) - Tita	IL	2L+PS	63	5.5	347
	SH-180/SH-121	Tita - Sawantwadi	IL	2L+PS	37	5.5	204
	SH-123	Sawantwadi - Redi Port	IL	2L+PS	30	5.5	165
Total Cost of Phase 2							**6,478**

	Road	Sections	Existing lanes	Proposed Lanes	Length	Cost per km (in Cr)	Total Cost (in Cr)
2027(Phase 3)							
1	SH-58	Satara - Mhaswad	2L+PS	4L	83	6.5	540
2	SH-134	Sankeshwar (NH-4) - Tita	2L+PS	4L	63	6.5	410
	SH-180/SH-121	Tita - Sawantwadi	2L+PS	4L	37	6.5	241
	SH-123	Sawantwadi - Redi Port	2L+PS	4L	30	6.5	195
Total Cost of Phase 3							**1,386**
Total Cost of Road Improvements in Maharashtra State							**10,714**

Source: Egis

Note: Cost does not include Land acquisition cost

Table: Phasing and Cost of Road Improvements for BMEC in Karnataka

S.no	Road	Sections	Existing lanes	Proposed Lanes	Length	Cost per km (in Cr)	Total Cost (in Cr)
2017 (Phase 1)							
1	NH 63	Hubballi-Ankola	2L	4L	132	Project Under NHAI	
2	NH 206	Tumakuru- Honnavar Port	2L	4L	373	9	3357
3	NH 13	Chitradurga/Ballari- Mangaluru	2L	4L	313	9	2817
4	SH 71 & SH 71E	Tiptur - Hassan	IL	2L+PS	53	5.5	292
5	SH-19	Challakere - Ballari	2L+PS	4L	103	Project Under MoRTH	
6	SH-1	Thirthahalli - Agumbe	IL	2L+PS	46	5.5	253
	SH-65	Agumbe - Malpe Port	IL	4L	43	11	473
7	SH-2	Haveri - SH-69 (Yekkambi)	IL	2L+PS	54	5.5	297
	SH-69	SH-69 (Yekkambi) - NH-17 (Kumta/Belekeri)	IL	4L	73	11	803
Total Cost of Phase 1							**8,292**
2022(Phase 2)							
1	NH 48	Bengaluru- Mangaluru	2L/4L	6L	353	Project Under NHAI	
2	NH 234	Sira- Mangaluru	2L	4L	288	9	2592
3	SH-20	Belagavi - Salahalli	2L+PS	4L	80	6.5	520
4	SH-12	Vijayapura - Athani	2L+PS	4L	74	6.5	481
Total Cost of Phase 2							**3,593**
2027(Phase 3)							

1	SH 71 & SH 71E	Tiptur - Hassan	2L+PS	4L	53	6.5	345
2	SH-1	Thirthahalli - Agumbe	2L+PS	4L	46	6.5	299
3	SH-2	Haveri - SH-69 (Yekkambi)	2L+PS	4L	54	6.5	351
Total Cost of Phase 3							**995**
Total Cost of Road Improvements in Karnataka State							**12,880**

Source: Egis

Note: Cost does not include Land acquisition cost

Tunnel Cost

Based on the analysis carried out by Japan International Co-operation Agency (JICA) for Shiradi Ghat section and increase in cost of construction year on year it is assumed that the cost of constructing a tunnel of 2 lane will be 160 cr/km. Similarly for construction of Shiradi Bypass the cost of construction is assumed as 145 cr/km for 2 lane.

Phase wise implementation of Tunnels and Bridges in BMEC region with the estimated construction cost is presented in table below.

Table: Cost of Proposed Road Tunnels and Bridges in Karnataka and Maharashtra

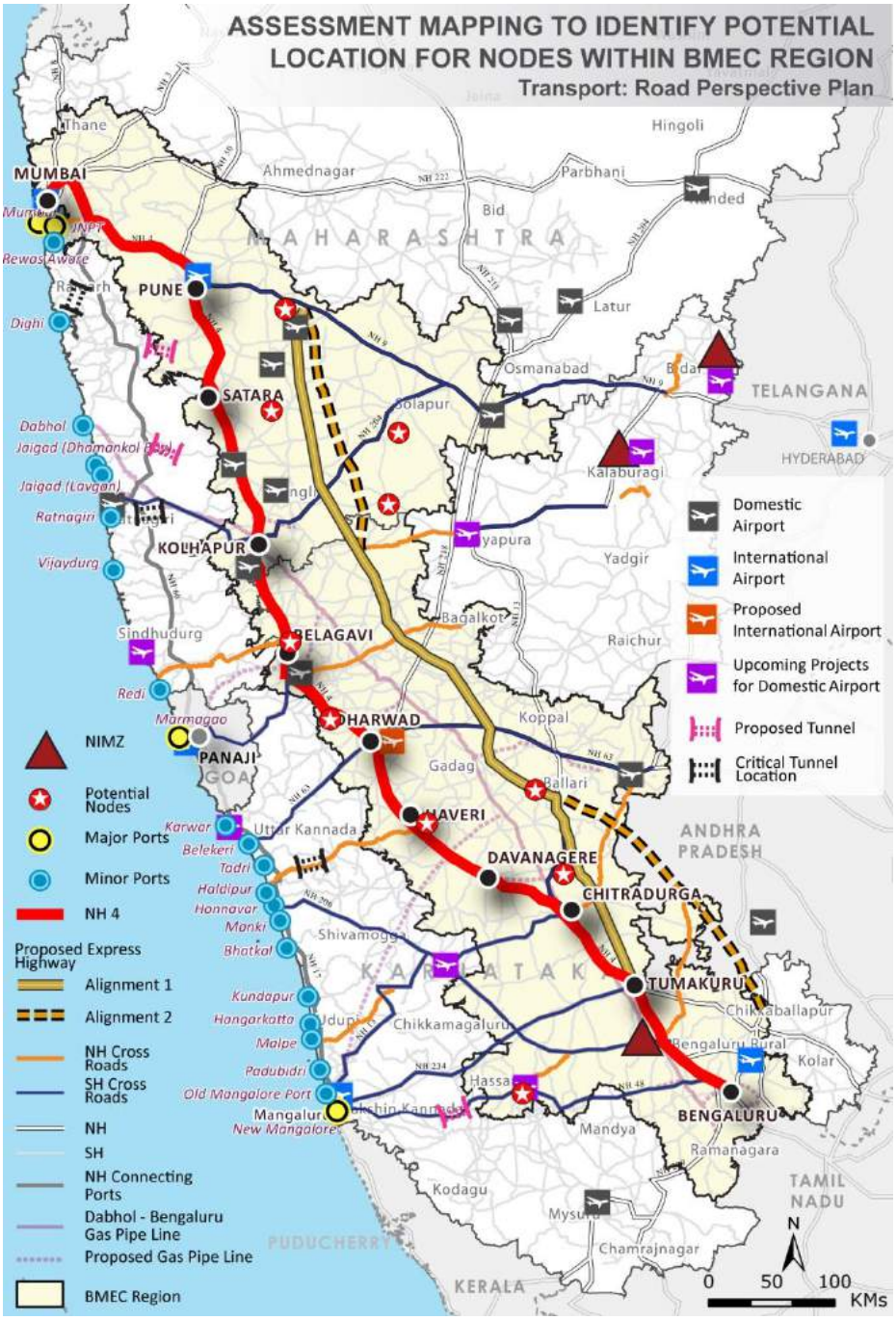
S.no	Ghat section	Road	Ghat Length (in km)	Tunnel/Bridge	Approx Length (in km)	Proposed Lanes	Cost per km (in Crores)	Total Cost (in Crores)
MAHARASHTRA								
2017 (Phase 1)								
1	Ghatmatha	SH-78	11.5	Bored Tunnel	4.5	2 Lane	160	720
2	Ghatmatha	Rail	11.5	Bored Tunnel	4.5	2 Line	160	720
3	-	SH-105	-	Bridge	0.85	2 Lane	-	40
3	-	Rail	-	Bridge	0.85	2 Line		40
4	Ambaghat	NH-204	11.5	Realignment or Tunnel Options need to be Studied in Detail				
2022(Phase 2)								
1	Varandha Ghat	SH-70	6.1	Bored Tunnel	1.0	2 Lane	160	160
2	Varandha Ghat	Rail	6.1	Bored Tunnel	1.0	2 Line	160	160
3	Harkol Kond	SH-99	2.6	Realignment or Tunnel Options need to be Studied in Detail				
4	-	SH-105	-	Bridge	0.85	2 Lane	-	40
KARNATAKA								
2017(Phase 1)								
1	Shiradi Ghat	NH-48	46	Bored Tunnel+Bridges	18.5	2 Lane	145	2683
2	Kodambale-Balekoppa	SH-69	6.5	Realignment or Tunnel Options need to be Studied in Detail				
2022(Phase 2)								

1	Shiradi Ghat	NH-48	46	Bored Tunnel+Bridges	18.5	2 Lane	145	2683

Source: Egis

BMEC perspective plan showing the proposed road network along with potential nodes is presented in map below and a detailed map covering all the proposed transport perspective components is presented in the Comprehensive Perspective Plan Map of BMEC in subsequent chapter.

Map: Road Perspective Plan



Source: Egis

13.3 RAILWAYS

13.3.1 Existing Scenario- Rail Infrastructure: Highlights

BMEC corridor is served mainly by three railway zones namely, South Western Railway (SWR), Central Railway (CR) and Konkan Railway (KR) details of these railway zones are presented in the following table.

Table: Various Railway Zones of BMEC region:

Sl. No.	Zonal Railway	Headquarters	Divisions	Route Km	Gauge
1	Central Railway (CR)	Mumbai	Mumbai, Bhusawal, Pune, Solapur and Nagpur	3,905	BG, NG
2	South Western Railway (SWR)	Hubballi	Hubballi, Bengaluru, and Mysuru	3,282	BG
3	Konkan Railway	Navi Mumbai	-	741	BG

Passenger traffic within the BMEC zones constitutes around 23% of the total volume being transported via railways. Some of the major existing railway corridors in the region are

a) **Bengaluru-Guntakal-Raichur-Wadi-Solapur-Daund-Pune-Mumbai**
b) **Bengaluru-Mysuru-Hassan-Mangaluru Central-Madgaon-Ratnagiri-Roha-Panvel-Mumbai**
c) **Bengaluru-Tumakuru-Arsikere-BirurJn-Davangere-Hubballi-Belagavi-Miraj-Pune-Mumbai and**
d) **Bengaluru-Guntakal-Ballari-Gadag-Bagalkot-Vijayapura-Solapur-Daund-Pune-Mumbai**

Out of the above four corridors, first corridor is double line corridor except for the section between Bengaluru and Guntakal, the doubling work of which is under progress.

13.3.2 Identification of Major issues & Bottlenecks

- Comparing the operational parameters it can be noted that the route length per kilometre is less in Karnataka (16) and Maharashtra (18) compared to the states of Gujarat (27), Kerala (27) and Tamil Nadu (31) & well below national average of 19.2. The electrification percentage is also relatively less.

- The major constraint which limits the network development is the presence of geographical barriers such as Western Ghats. For this reason, there is no direct rail connectivity to various ports in these states. Being an Ecologically Sensitive Area (ESA), the construction through the Ghats is a Challenge

- Except the Sholapur- Pune line, none of the rail link within the region is identified as Trunk Route or line and even this line is not an electrified trunk line. This indicates the lack of priority of rail infrastructure in the region.

- Another drawback of network is that there is no direct connectivity or shortest connectivity between important places resulting in increased travel time. As a result, the railway network **running parallel to NH 4 is 1029 km long between Bengaluru City station and Pune against the road distance of 837 km.** The on-going new line projects such as Tumakuru – Chitradurga – Davanagere line will help to reduce the travel time.

- Cost of land has gone up considerably, especially the areas along NH4 region, which is a major bottleneck for all rail development projects in the region. i.e. on an average the cost of land is not more than 10% of the overall development cost of rail infrastructure, however the land component has gone up to 30% making the projects unavailable. This is one prime issue which needs to be addressed to enhance all transport infrastructure components.

- Some of the zones within the region have pointed out that, annual budget allotment for respective zones are less than 5% of the total cost of projects outlined for the FY. At this lower rate of budget allocation, it is estimated that the projects identified for immediate implementation would take another 25 years.

- Lack of direct rail connectivity to existing Ports and limited access/ connectivity between Konkan Rail line and the Rail lines of BMEC region, is also a major constrain which needs to be addressed as part of the Rail infrastructure development of the region

13.3.3 Forecasts and Need for Enhancement of Rail Infrastructure for BMEC Region

- **Railway Passenger Traffic in BMEC region comprising mainly South Western Railway, Central Railway and Konkan Railway divisions is growing at an annual rate of about 10%since 2009.**

- The passenger traffic growth in 2013-14 is mere 1.1% over the previous year (2012-13) for the overall BMEC region. Similarly, freight traffic has grown at 1.7% in 2013-14 over the previous year in the region.

- With the economic impetus proposed through development of Economic Corridor, the growth is expected to reach double figures as a result of increased employment potential by the proposed industries and development of allied infrastructure facilities.

- With over double digit growth of passenger traffic anticipated, the capacity of the tracks is supposed to be exhausted in decade unless improvements like construction of additional tracks or automatic signalling system are proposed. Industrial growth and urbanization proposed in the BMEC region, is further expected to accelerate the traffic growth & the traffic volumes will exceed capacity of the railway corridor much earlier than a decade

- Railway Passenger Traffic in BMEC region comprising mainly South Western Railway, Central Railway and Konkan Railway divisions is growing at an annual rate of about 10% since 2009. The passenger traffic growth in 2013-14 is mere 1.1% over the previous year (2012-13) for the overall BMEC region. Similarly, freight traffic has grown at 1.7% in 2013-14 over the previous year in the region.
- Omitting the previous year data due to global recession, nationwide trend observed for last 8 years from 2003-04 to 2011-12 shows a passenger traffic revenue increase of 9.91% and goods traffic revenue increase of 11.98%.
- Due to economic impetus in the BMEC region consultant, in the absence of time series data on passenger and freight traffic, propose growth rates of 20% and 50% more than these rates. Accordingly based on the experience of similar projects in India and elsewhere, the passenger and freight traffic growth rates adopted are **11.89%, 17.97% respectively. The**

rates can be substantiated as the development of Economic Corridor will be accompanied by increased employment by proposing industries, development of mega cities and allied infrastructure facilities for a sustainable development of the region using green technologies.

Existing railway corridors between Bengaluru- Mumbai in the region, the consultant studied in detail alignment and traffic on these four routes

a) Bengaluru-Guntakal-Raichur-Wadi-Solapur-Daund-Pune-Mumbai
b) Bengaluru-Mysuru-Hassan-Mangaluru Central-Madgaon-Ratnagiri-Roha-Panvel-Mumbai
c) Bengaluru-Tumakuru-Arsikere-BirurJn-Davangere-Hubballi-Belagavi-Miraj-Pune-Mumbai and
d) Bengaluru-Guntakal-Ballari-Gadag-Bagalkot-Vijayapura-Solapur-Daund-Pune-Mumbai

Table: Alternative DFC route alignment within BMEC region:

Corridor 1: Via Guntakal, Solapur		Corridor 2: Via Konkan Railway		Corridor 3: Via Arsikere, Hubballi		Corridor 4: Guntakal, Ballari, Bagalkot	
From	To	From	To	From	To	From	To
Bengaluru	Guntakal	Bengaluru	Mysuru	Bengaluru	Tumakuru	Bengaluru	Guntakal
Guntakal	Raichur	Mysuru	Hassan	Tumakuru	Arsikere	Guntakal	Ballari
Raichur	Wadi	Hassan	Mangalulu Central	Arsikere	BirurJn	Ballari	Gadag
Wadi	Solapur	Mangalulu Central	Madgaon	BirurJn	Davangere	Gadag	Bagalkot
Solapur	Daund	Madgaon	Ratnagiri	Davanagere	Hubballi	Bagalkot	Vijayapura
Daund	Pune	Ratnagiri	Roha	Hubballi	Belagavi	Vijayapura	Solapur
Pune	Mumbai	Roha	Mumbai	Belagavi	Miraj	Solapur	Daund
				Miraj	Pune Jn	Daund	Pune
				Pune Jn	Mumbai	Pune	Mumbai

Out of the above four corridors, first corridor is double line corridor except for the section between Bengaluru and Guntakal, the doubling work of which is under progress. Rest of the corridors are partially or completely double lines.

Out of the above railway routes, Route 1 is an existing trunk route with double line, except between Bengaluru and Guntakal doubling work which is under progress. Route passing through Konkan Railway (route 2) falls under environmentally sensitive zone due to which doubling is not proposed for this corridor. The remaining route 3 and Route 4, which are partially double line, are proposed for doubling. **Moreover, the Dedicated Freight corridor proposed between Bengaluru and Mumbai is proposed parallel to corridor 3 away from the exiting railway lines, which is the spine of the BMEC region and will be connected to the coastal areas and ports through spur lines.**

As per the projections estimates, the capacity is exceeding on all the tracks by 2020. Hence in order to let the uninterrupted flow of freight and passenger traffic, **double line cum Dedicated Freight Corridor needs to be operational by 2022 between Bengaluru and Mumbai.**

Alternatively by introducing automated signalling system would increase the capacity to 288 trains per day by reducing headway to 5 min. Further introducing CBTC signalling system would increase the capacity to 634 trains per day (26 trains per hour). By using these systems DFC construction can be differed to 2030.

However, in view of the huge goods traffic generated with the installation of industries and integrated transport facilities proposed, it is advised that Dedicated Freight Corridor needs to be constructed by 2022.

Map: Map showing Ongoing& Proposed DFCs corridors in India &its possible link with BMEC

13.3.4 Projects Proposed by Indian Railways

There are various proposal and on-going projects for new lines and doubling. Following tables list out the completed and on-going projects in CR and SWR.

Table: Status of Various projects in CR under BMEC region

	Name of work	Latest Anticipated Cost in Rs. Crore	Present Status (as on June '13)
	New Lines (PH-11)		
1	Baramati-Lonand (54 Km)	138.48	Work in Progress
	Total	**138.48**	
	Gauge Conversion (PH-14)		
1	Miraj- Latur (Via Sangli & Solapur Dsit)(359km)	950.00	Completed- Revised work in progress.
	Total	**950.00**	
	Doublings (PH-15)		
1	Kalyan-Kasara 3rd line.	277.70	Work in Progress
2	Panvel-Roha (75.44 km) land acquisition	17.25	Work in Progress
3	Diva-Kalyan Doubling of 5th& 6thline	69.75	Completed
4	Panvel-Jasai-JNPT (28.5 km)	53.23	Completed
5	Panvel - Pen (35 km)	190.99	Work in Progress

6	Pen - Roha (40 km)	203.00	Work in Progress
	Total	**811.92**	

Table: Various Ongoing & recently completed Projects in SWR within BMEC

	Name of the Projects	Length (Km)	Anticipated Cost (Rs in Cr)	Status
A	**New Lines**			
1	Kottur - Harihar New Line (Cost Sahring with GoK)	65	488.70	Completed
2	Kadur – Chikkamagaluru New line (part of Kadur-Chikkamagaluru-Sakleshpur) (93)	46	244.74	Completed
3	Chikkamagaluru- Sakleshpur New Line (part of Kadur-Chikkamagaluru-Sakleshpur (93) (Land free of cost from Govt. of Karnataka)	47	644.78	In Progress
4	Hassan- Bengaluru New line(Cost Sahring with GoK)	166	1,289.92	In Progress
5	Rayadurga- Tumakuru via Kalyanadurga New(Cost Sahring with GoK)	207	1,743.01	In Progress
6	Bagalkot-Kudachi (land free of cost from GoK) New line	142	986.30	In Progress
	Cost Sharing Projects with GoK, Approved by Planning Commision , yet to be implemented			
8	Tumakuru – Chitradurga - Davangere new(Cost Sahring with GoK)	200	1,801.01	Approved by Planning Commission
9	Hejjala - Chamarajanagar New Line (part of Bengaluru-Satyamangalam NL)	140	1,382.78	Approved by Planning Commission
10	Whitefield- Kolar New line	53	348.85	Approved by Planning Commission
11	Shivamogga-Harihar New line	79	832.47	Approved by Planning Commission
12	Gadag-Wadi New line	252	1,922.00	Approved by Planning Commission
	Cost Sharing Projects with GoK, yet to be approved			
15	Chickballapur-Gowribidanur New Line	44	367.77	Yet to be approved
16	Hubballi-Ankola New Line	167	2,315.00	Yet to be approved
	SW Projects other than Cost Sahring Doubling			
18	Ramanagram- MysuruDoubling	93	874.57	In Progress
19	Yelhanka-Chennasandra Doubling	13	107.67	In Progress
20	Yeshwantpur-Yelhanka Doubling	12	94.96	In Progress
21	Birur-Shivani Doubling	29	142.64	In Progress
22	Hosadurga-Chikjajur Doubling	29	203.40	In Progress
23	Shivani-Hosdurga Doubling	10	39.36	In Progress
24	Tornagallu-Ranjithpura Doubling	23	167.50	In Progress
25	Hosapete-Hubballi-Londa-Vasco (352 km)			In Progress
	i) Hosapete- Tinaighat (ADB funding)	245	928.00	
	ii) Tinaighat-Vasco-da-gama Doubling	108	1800.00	
C	**Gauge Conversion**			
26	Kolar- Chikballapur (GC)	85	440.34	Completed
D	**Quadrupling**			
27	Bengaluru- Krishnarajapuram-Whitefield Quadrupling	23	137.64	In Progress

13.3.5 Proposed Rail Perspective Plan

The below figure shows the railway lines being developed by Indian railways. The direct link from Tumakuru to Davanagere reduces the travel time between these cities considerably. Connecting Bengaluru to Hassan will help in reduction of travel time between Bengaluru and Mangaluru and will boost freight movement to and from Mangaluru Port. Upcoming new line along Hubballi – Ankola provides easy access to the ports such as Honnavar, Tadri etc.

Ballari-Hubballi-Goa section of Chennai-Goa Dedicated Freight Corridor proposed by Government of India is going to improve connectivity between the BMEC region and Konkan Railway towards

improving port connectivity. In addition, Bengaluru - Hassan railway line which is under construction by Ministry of Railways is also going to improve port connectivity to Mangaluru.

Apart from these lines, few links have been proposed by GoK & MoR for improving the industrial growth. These lines are shown in table below.

Table: Major Railway Lines Proposed by Government of Karnataka, under consideration by SW railways & which awaits planning commission approval

	Railway Line	Length (km)	Investment required (Rs. Crore)	Benefits
1	Hubballi - Ankola	167	2315	Port connectivity for iron ore movement from Ballari – Hosapete region
2	Vijayapura - Shahabad	140	840	Cement Industrial Zones
3	Kuduchi - Bagalkot	142	816	Cement Industrial Zones and port connectivity
4	Londa – Goa (doubling)	109	1800	Connectivity to port for iron ore, cement, steel and power projects
6	Gadag – Haveri	54	299	Port connectivity to industrial regions
7	Alamatti - Koppal	150	600	Connectivity for cement and iron ore industries to proposed/ under implementation Bellari- Goa DFC

Source: Railway Infrastructure Plan Karnataka, 2009

In view of the boom in transportation need for passenger and goods movement in the BMEC region due to industrialisation, BMEC's Rail Perspective Plan provides special emphasises to **Bengaluru-Hassan rail link, Ballari-Hubballi-Akola rail link, and Ballari-Hubballi-Goa as part of Chennai-Goa DFC** under consideration by GoI.

In order to overcome the major challenge of crossing the **Western Ghats** to improve connectivity to ports on the west coast Government of Karnataka with the assistance of JICA proposed a **18.5 km of green bypass for NH-48** in close **proximity to the Mangaluru-Hassan Railway line including 7.7 km green tunnel alignment.** The consultant proposes acquisition of additional right of way to accommodate railway lines in the tunnel portion to be considered for strengthening port connectivity needs of the BMEC Region.

All the existing single track railway corridors in the BMEC region need to be doubled in order to cater to the needs of the BMEC region. Doubling of few of the corridors is already under consideration by Ministry of Railways.

Diamond Quadrilateral cum DFC proposal:

As part of the Rail Perspective of BMEC, as discussed above its proposed to upgrade and enhance the existing Bengaluru- Mumbai rail link via Hubballi- Belagavi- Satara- Pune (Rail line 3) into a Double line electrified line with possibility to upgrade it into a High Speed Rail connectivity as part of the proposed Diamond Quadrilateral alignment. This link will be upgraded with an independent third line which will act as a DFC. Already, SWR & CR have considered providing direct link between Tumakuru& Davanagere, Hubballi to Belagavi ETC. however, the proposal is only for single line and not electrified and further, the Hubballi to Belagavi line is yet to be approved. Hence, the proposal under BMEC has incorporated the same considering double lining and electrification. The following table provides the estimated cost of these proposals, which is excluding the land cost.

Table: Bengaluru- Pune Diamond Quadrilateral cum DFC proposed under BMEC rail Perspective

	New Rail projects proposed under BMEC	Proposal	Length (Km)	Cost (Rs. In Crore)	Remarks
1	Bengaluru - Pune (via Hubballi - Belagavi-Sangli)	additional DFC line along diamond quadrilateral	1018	25961	**DFC (Diamond Quadrilateral)**
Bengaluru – Pune Diamond Quadrilateral					
1	**Miraj-Pune**	**Double line electrified (Upgradation of Exiting Line)**	**240**	**2520**	**Part of Bengaluru – Pune Diamond Quadrilateral Proposal**
2	**Belagavi- Miraj**	**Double line electrified(Upgradation of Exiting Line)**	**138**	**1587**	**Part of Bengaluru – Pune Diamond Quadrilateral Proposal**
3	**Hubballi - Belagavi**	**Double line electrified (Proposed New Line)**	**141**	**1481**	**Part of Bengaluru – Pune Diamond Quadrilateral Proposal. SWR has already proposed for Single line upto Shawantwadi**
4	Davanagere- Hubballi	Double line electrified **(Upgradation of Exiting Line)**	144	1512	**Part of Bengaluru – Pune Diamond Quadrilateral Proposal**
5	Tumakuru-Davanagere	**Double line electrified (Proposed New Line)**	256	2688	**Part of proposed Diamond Quadrilateral.** Single line is proposed under SWR. Double line with electrification is proposed under BMEC.
Total Cost of Bengaluru – Pune Diamond Quadrilateral double line with Electrification				**9788**	

Other Proposed Rail links & Upgradation as proposed under BMEC Rail perspective:

Apart from the above-mentioned Diamond Quadrilateral cum DFC proposal, the BMEC region's rail infrastructure is proposed to be enhanced with an objective to provide port connectivity, connectivity to proposed Industrial Nodes and other industrial development around the region. This will also improve the low rail index and low electrification ratio of the region. Some of the major links include, proposed DFC Spur lines connecting the proposed Bengaluru- Pune DFC to the western coast Ports of NMPT, Karwar, Mormugao, proposed ports at Tadri/ Haldipur Ports, Dighi, Jaigad, Dabhol, etc. The following tables provide the list of proposed new rail links and proposed rail upgradation project considered under BMEC's rail perspective:

Table: New lines proposed as part of BMEC's Rail Perspective Plan

Sl. No	New Rail projects proposed under BMEC	Proposal	Length (Km)	Cost (Rs. In Crore)	Remarks
Maharashtra Region					
1	Baramati-Lonand-Shirwal-Mahad-Dighi	Double line electrified,	250	3275 (additional 160 Crs for Tunnel)	**Port connectivity to Dighi Port.**Baramati - Lonanad section, single line, is already under implementation by CR. Remining stretch is proposed as part of BMEC perspective.
2	Karad-Chiplun- Jaigad port	Double line electrified,proposed as DFC spur line	160	2160 (additional 720 Crs for Tunnel + 40 Crs for Bridge)	**Port Connectivity to Jaigad Ports& Dabhol**

Sl. No	New Rail projects proposed under BMEC	Proposal	Length (Km)	Cost (Rs. In Crore)	Remarks
3	Thal-Rewas Port	Double line electrified ,	20	510	**Port Connectivity to Rewas Port**
Total Cost of New Rail Lines Proposed as part of BMEC Rail perspective- Maharashtra(Excluding Cost of Tunnels& Bridge)				**5945**	
Total Cost of New Rail Lines Proposed as part of BMEC Rail perspective- Maharashtra (Including Cost of Tunnels& Bridge)				**6825**	
Karnataka Region					
1	Hubballi- Ankola	Double line electrified, proposed as DFC spur line	167	3596	**Port connectivity to Murmugoa Port, Karwar, Belekeri , Proposed Tadri &Haldipur Ports**
2	Tinaighat-Vasco da Gama	Double line electrified, proposed as DFC spur line	108	1458	**Last section of Bellari – Vasco DFC, which is funded upto** Tinaighat by ADB. Balance is proposed under BMEC proposal. **Port connectivity to Murmugoa Port.**
3	Bengaluru-Hassan-Sakleshpur-NMPT	Double line electrified, proposed as DFC spur line to Mangaluru Port	360	4860(additional 2683 Crs for Tunnel)	**Port Connectivity of Mangaluru Port to Bengaluru, Tumakuruu, Davangere & Chitradurga**.Cost exluding Bengaluru- Hassan single proposed SWR and excluding cost of double line tunnel at Shiradi western ghat.
4	Kadur- Chikkamagaluruu-Sakaleshpur	Double line electrified	102	1377	Kadur-Chikkamagaluruu single line is already completed, Chikkamagaluruu-Shakaleshpur is under implementation. BMEC rail perspective proposes docubling of this new line which will connect Chitradurga, Davanagere, Koppal, Hosapete & Bellari to NMPT
5	Bidar – Kalaburagi	Double line electrified	117	2390	NIMZ Connectivity Line, New line proposed by Railways considered as part of BMEC rail perspective.
6	Bagalkot – Belagavi (Kudachi)	Double line electrified	145	1958	Project Proposed by SWR, proposed as Double line with electrification as part of BMEC
7	Belagavi - Sawantwadi-Redi Port	Double line electrified	122	1647	Project under consideration by SWR. Belagavi-Sawantwadi will be a **Port Connectivity** proposal to Redi Port. Double lining of the entire stretch proposed under BMEC. **Dharwad-Belagavi stretch is proposed as part of Diamond Quadrilateral under BMEC perspective.**
8	Talaguppa - Honnavar	Double line electrified	74	999	**Port Conectivity Project**. Connects toHonnavar & Proposed Haldipur /Tadri ports .Thalaguppa- Honnavar section is a new line proposed by SWR. Doubling is proposed under

Sl. No	New Rail projects proposed under BMEC	Proposal	Length (Km)	Cost (Rs. In Crore)	Remarks
					BMEC.
9	Koppal - Kudalasangama Road (Almatti)	Double line electrified	121	1452	Connects Koppal (DFC) to Bagalkot ,Vijayapura& Solapur
10	Gadag - Haveri	Double line electrified	54	729	Connects Gadag (DFC) to Haveri (Bengaluru- Pune DFC)
11	Shahabad - Shedbal	Double line electrified	260	3510	Connects Kalaburagi (NMIZ) to Belagavi (DFC) and connects to other western ports through Belagavi.
12	Yadgir - Kudalasangama Road (Bagalkote/ Almatti)	Double line electrified	169	2282	Connects Yadgir to BMEC
13	Davanagere - Shivamogga	Double line electrified	90	1215	Connects Davanagere to Honnavar & Proposed Haldipur /Tadri ports via Shivamogga. Proposed as single line by SWR. Doubling is proposed under BMEC
Total Cost of New Rail Lines Proposed as part of BMEC Rail perspective- Karnataka (Excluding Cost of Tunnels)				**26123**	
Total Cost of New Rail Lines Proposed as part of BMEC Rail perspective- Karnataka (Including Cost of Tunnels)				**28815**	

Table: Railway lines proposed for upgradation under BMEC rail Perspective

Sl No.	Proposed Upgradtion Projects	Proposal	Length (Km)	Cost (Rs. In Crore)	Remarks
Maharashtra Region					
1	Pen-Thal	Double line electrified	29	305	Port connectivity to Rewas
2	Daund (Kurukumbh) - Solapur-Kalaburagi	Double line proposed for section between Bhigvan to Mohal and Hotgi to Kalaburagi. Reminaing part of the line proposed to be Electrified	300	1395	Enhancement of Connectivity between Kalaburagi(NIMZ)-Solapur (BMEC Node)& Kurukumbh- Bhigvan (Potential BMEC Node of Pune) to Pune, JNPT,Mumbai Ports & other Maharashtra Ports.
3	Kolhapur-Miraj-Sangole-Pandharpur-Kurduvadi	Double line electrified	235	2468	Enhnacment of connectivity between Pune- Solapur Region of BMEC to Sangli & Kolhapur Region of BMEC and the nearest western coast ports.
Total Cost of proposed upgradtion of existing Rail Lines - Maharashtra				**4168**	
Karnataka Region					
1	Hosapetee-Davanagere	Double line electrified	130	1365	Enhances the connectivity between Bellari region to NMPT & other proposed ports
2	Davanagere- Birur	Davangere to Chikjajjur is proposed to be madeDouble line electrified.Chikjajjur to Birur, which is already under implementation by SWR is proposed to be electrified	110	1155	Enhance the connectivity between Davangere & Chitradurga to NMPT
3	Tumakuru-Arsikere-Birur-Shivamogga-Thalaguppa	Arsikere to Devanur is already double line. BMEC proposes the entire stretch	294	1764	**Port connectivity to Honnavar and proposed Tadri & Haldipur Ports.**

Sl No.	Proposed Upgradtion Projects	Proposal	Length (Km)	Cost (Rs. In Crore)	Remarks
		to be double line and electrifie			
5	Arsikere-Hassan	Double line electrified	45	473	Port connectivity to enhance connectivity between Tumakuru , Chitradurga, Davangere & NMPT
6	Chitradurga-Challakere-Molakalmuru-Rayadurga-Ballari	Double line electrified	152	1596	Enhancement of connectivity between Bellari to Chitradurga which will provide shortest connectivity to NMPT & proposed ports.
7	Gadag-Bagalkot-Vijayapura- Solapur (Hotgi Jn)	Double line electrified	295	3098	Enhancement of connectivity between Solapur- Vijayapura to Gadag (DFC line) and other parts of BMEC region.
8	Davangere-Hagaribommanahalli/ Kotturu - Hosapetee	Double line electrified	125	1313	Enhancement of connectivity between Hosapete to Davangere and then to the ports
Total Cost of proposed upgradtion of existing Rail Lines - Karnataka				**9672**	

Phasing:

Consultant proposes the following phasing of the projects based on the traffic demand, to let the region develop uniformly and few corridors with strategic importance like port connections which will provide logistic support.

Table: Projects Phasing

Sl. No.	Rail projects proposed under BMEC	Proposal Type	Length (Km)	Cost (Rs. In Crore)	State
		Phase I - 2017			
1	Hosapetee- Davanagere	Upgradtion	130	1365	Karnataka
2	Davanagere- Birur	Upgradtion	110	1155	Karnataka
3	Tumakuru-Arsikere- Hassan	Upgradtion	142	1491	Karnataka
4	Davangere-Hagaribommanahalli/Kotturu-Hosapetee	Upgradtion	125	1313	Karnataka
5	Davanagere- Hubballi	DQ Project (Upgradtion)	144	1512	Karnataka & Maharashtra
6	Tumakuru-Davanagere	DQ Project (New Line)	256	2688	Karnataka
7	Miraj-Pune	DQ Project (Upgradtion)	240	2520	Maharashtra
8	Hubballi- Belagavi	DQ Project (New Line)	141	1481	Karnataka
9	Belagavi-Miraj	DQ Project (Upgradtion)	138	1587	Karnataka & Maharashtra
10	Gadag – Haveri	New Line	54	729	Karnataka
11	Shahabad - Shedbal	New Line	260	3510	Karnataka
12	Davanagere - Shivamogga	New Line	90	1215	Karnataka
13	Bengaluru-Hassan- Sakleshpur-New Magalore Port	DFC Spur Line- New Line	360	4860	Karnataka

14	Karad-Chiplun- Jaigad port	DFC Spur Line- New Line	160	2160	Maharashtra
15	Kadur-Chikkamagaluruu- Sakaleshpur	New Line	102	1377	Karnataka
	Total Phase I		**2452**	**26443**	
	Phase II – 2022				
1	Bengaluru - Pune (via Hubballi - Belgavi- Sangli)	Main DFC- New Line	1018	25961	Karnataka & Maharashtra
2	Bidar - Kalaburagi	New Line	117	2390	Karnataka
3	Daund (Kurukumbh) - Solapur-Kalaburagi	Upgradtion	300	1395	Maharashtra & Karnataka
4	Chitradurga-Challakere-Molakalmuru-Rayadurga-Ballari	Upgradtion	152	1596	Karnataka
5	Kolhapur-Miraj-Sangole-Pandharpur-Kurduvadi	Upgradtion	235	2468	Karnataka & Maharashtra
6	Bagalkot – Belagavi(Kudachi)	New Line	145	1958	Karnataka
7	Ankola-Hubballi	DFC Spur Line- New Line	167	3596	Maharashtra, Karnataka & Andhra Pradesh
8	Baramati-Lonand-Shirwal-Mahad-Dighi	New Line	250	3275	Maharashtra
	Total Phase II		**2384**	**42639**	
	Phase III- 2027				
1	Belagavi - Sawantwadi-Redi Port	New Line	122	1647	Karnataka & Goa
2	Pen-Thal	Upgradtion	29	305	Maharashtra
3	Thal-Rewas Port	New Line	20	510	Maharashtra
4	Talaguppa - Honnavar	New Line	74	999	Karnataka
5	Birur-Shivamogga-Thalaguppa	Upgradtion	151	1586	Karnataka
6	Tinaighat-Vasco da Gama	DFC Spur Line- New Line	108	1458	Karnataka & Goa
7	Koppal - Kudalasangama Road(Almatti)	New Line	121	1647	Karnataka
8	Yadgir - Kudalasangama Road	New Line	169	2282	Karnataka
9	Gadag-Bagalkot-Vijayapura-Solapur(Hotgi Jn)	Upgradtion	295	3098	Karnataka
	Total Phase II		**1089**	**13532**	

Phasing of the projects is done considering DFC to be operational in phase II (2022) by which the existing railway lines between Bengaluru and Mumbai are going to get saturated. The port connectivity is spread in all the three phases owing to importance of the line and the prominence of the port it is getting connected to.

The various sections of DFC for development is given in the following table

Table: Phasing of DFC Corridor Construction

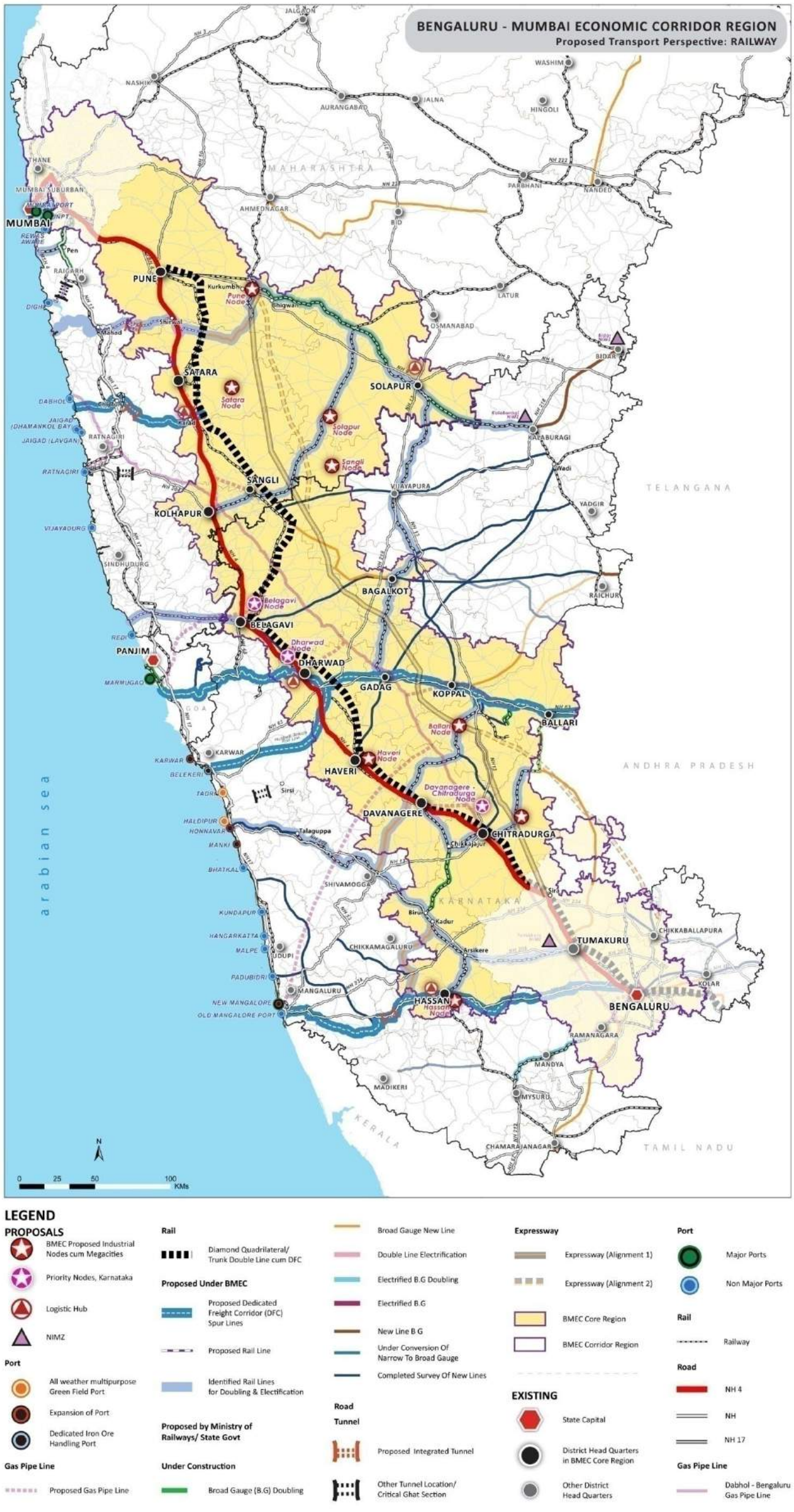
Section	Distance (Km)	Cost (in Rs.Crore)	Construction Period
Bengaluru– Arsikere	156	3978	2022-2027
Arsikere – Devengere	160	4080	2022-2027
Devengere –Hubballi	144	3672	2022-2027
Hubballi–Belagavi	141	3596	2022-2027
Belagavi– Sangli	145	3698	2022-2027
Sangli – Satara	127	3239	2022-2027
Satara – Pune	145	3698	2022-2027
Total	**1018**	**25961**	

The DFC corridor is divided into 7 sections as shown in above table, which can be taken up as separate contracts of completing the project as per schedule. The doubling of existing railwaylines parallel to DFC will be taken up in Phase I.

13.3.6 Comprehensive rail proposal map

Given below is the comprehensive rail proposal of the region.

Figure: Comprehensive rail proposal map



Source: South West Railways, Central Railways, Egis

13.4 PORTS & PORT CONNECTIVITY

The port infrastructure of the two states would play a vital role in inducing the envisioned economic & industrial development in BMEC region. This part of the report analyses the existing port infrastructure of the region, identify bottlenecks & issues to be addressed to enhance port infrastructure of the region, forecast the traffic demand due to development of BMEC and the need for expansion of Port capacity of the region and proposal to fulfil the increased capacity of the region.

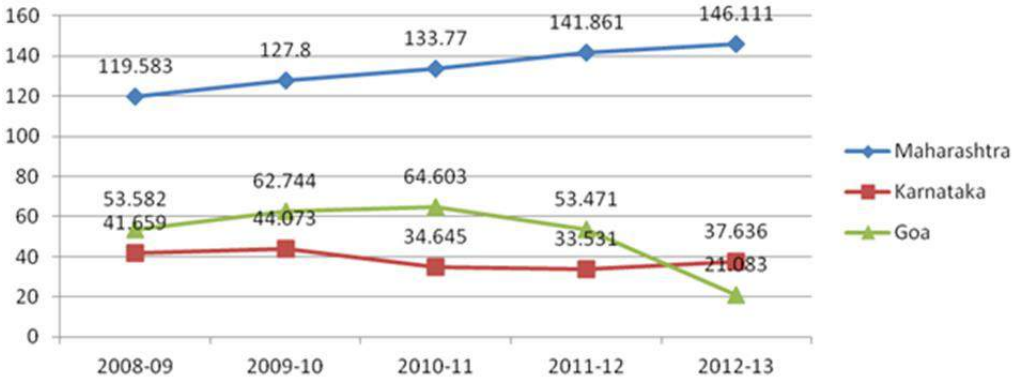
13.4.1 Existing Scenario – Port Infrastructure: Highlights

JNPT, MUMBAI, Mormugao & NMPT are the Major Ports of the region. **Rewas, Dighi, Jaigad Ports, Redi, Vijaydurg & Karwar** are some of the important Non Major Ports of the region. The number of existing major and minor ports in the two BMEC states and the traffic handled by these ports is shown below;

Table13: Number of major and Minor Ports in BMEC Region

State	Major Ports	Non Major/ Minor Ports
Karnataka	1	11
Maharashtra	2	48

Figure: Total Traffic Handled by Ports in BMEC States



Source: Indian Ports Association

- **Total capacity of all the ports of the BMEC region including Mormugao port is around 273.73 MTPA,** considering only the ports under the BMEC States of Maharashtra & Karnataka, the **capacity is around 223.03 MTPA** and the capacity excluding JNPT & Mumbai ports would be around **126 MTPA (163.32 MTPA including Mormugao),** out of which 76.7 MT is the capacity of NMPT

- Most of the Non Major Ports are under construction and are planned to have large capacity ranging from **5MTPA to 100 MTPA. Dighi is planned to have 100 MTPA, followed by**

75MTPA at Vijaydurg, 66 MTPA at Rewas, 18MTPA at Jaigad (Dhamankhol Bay) and 5MTPA each at Jaigad (Lavgan) & Redi ports

- **The total traffic handled by the ports in the BEMC States in 2012-13 is 183.74 MT of which 146.11 MT was from Maharashtra ports and 37.63 MT from Karnataka.**
- More than **90% of the traffic handled are through the 4 Major Ports** and share of Non Major ports of the region is currently very less as majority of them are new or under construction
- Out of the 4 Major Container Ports of India (capacity above 1 Million TEU), **JNPT (4.8 MTEU) is the only such port within the BMEC region**. Mumbai port handles slightly less than 1 million TEUs per annum. NMPT & Mormugao does not have large Container handling facilities and handle less than 1 lakh TEUs per annum.
- Iron ore was the major commodity handled in the region with almost 57% of the traffic handled (in 2009) however with the ban on export of iron ore, currently the region handles only 10.4 MT which is around 5.6% of the total traffic handled in 2012-13.
- JNPT & Mumbai ports are the busiest ports of the region with capacity utilization more than 100% and remaining ports of the region are underutilized. NMPT is utilized less than 50% of its capacity
- NMPT & Mumbai offer the deepest draft of the region with around 14 meters, Mormugao & JNPT also offers slightly less than 14 meters draft. However, none of the port is capable of handling Cape Size large vessels.

13.4.2 Comparative Assessment of Key Port Parameters

Efficiency & success of the port depends on certain key performance indicators like **Draft, Vessel Turnaround Time, Cargo Dwell Time, Optimum Asset Utilization, Modal Share of Cargo evacuation, Capacity Utilization etc.** In order to enhance the region's port infrastructure comparable to Global Standards & also improve competitiveness with other port of the country, these KPI of Major ports of the region & the country are assessed in comparison with some of the International Ports & Standards, as part of this section.

Comparative Assessment of KPI s with International Ports & Benchmarks

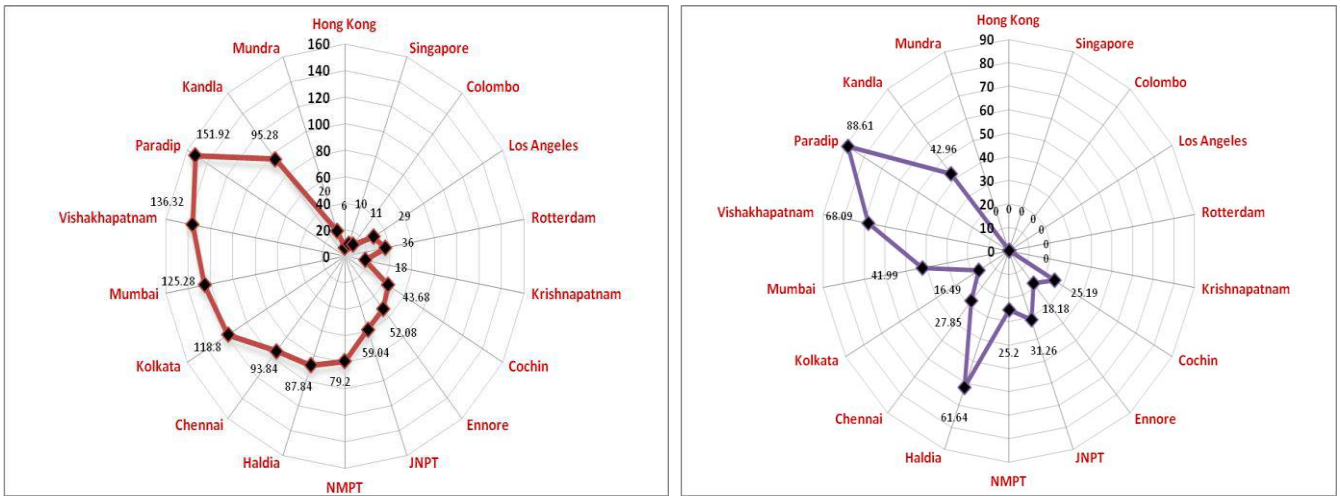
Three leading KPIs which are very relevant in port operations are, **Fast vessel turnaround, Cargo Dwell Time/ fast cargo transit and optimum asset utilisation.** Each has its own performance drivers and parties involved in the outcome. The following part assesses these parameters in comparison with India Ports.

VESSEL TURNAROUND TIME (VTT):

International ports range from 6 hours to 36 hours whereas for Indian ports it goes as high as 151.92 hours (more than 6 days). NMPT takes an average of 3.3 days, JNPT takes an average of 2.4 days & Mumbai port takes an average of 5 days. Indian Ports needs to reduce its Turnaround Time by reducing the time taken in **Cargo Handling, Loading & Unloading Cargos, reducing time taken in**

allowing the vessel from anchor point to berth/ Pre- Berthing time, by improving efficiency of port authority in pilotage/tugging and the efficiency of terminal operator in handling the vessel.

Figure: Comparison of Vessel Turnaround time (in hours)& Pre-berth Detention time of Indian and International Ports



Source: Port web sites, Indian Ports Association, e- magazine, December 2013

PRE BERTH DETENTION TIME (PBD):

PBD is the time taken by a ship from its arrival at the anchorage (reporting station) till it starts its movement to the working berth, i.e., operational berth. The Pre-berthing Detention (PBD) is a sub-component of the Vessel Turn Round Time.PBD time for most of the international ports is nil whereas in Indian ports it ranges as high as 88 hours. In NMPT is slightly more than one day & its 30% of VTT, Mumbai port takes close to 2 days & JNPT takes one & half days. **This situation indicate that majority of the India Ports are operating more than its Capacity or over utilised due to which vessels are made to wait for longer period before berthing.**

CARGO DWELL TIME:

Cargo Dwell Time is another important parameter to be assessed to gage the performance of the port.

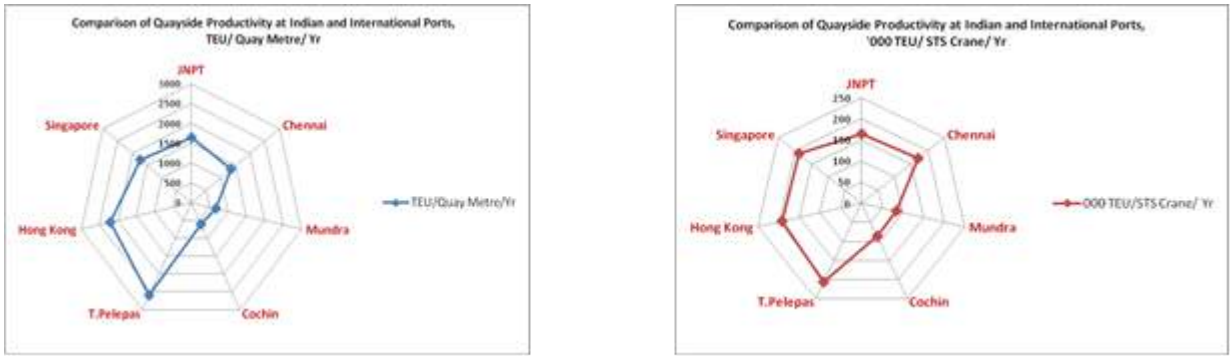
As per international port practices, Average Cargo Dwell Time is around 14 days for Bulk Cargo & around 0.6 to 0.8 days for Containers. The average Indian port lags far behind on international best practices in this KPI the dwell times of both container and bulk cargo are at least double that of international best ports i.e. **27 to 38 days for Bulk Cargo & 2 to 4 days for containers.**

ASSEST UTILISATION:

High productivity of port assets such a**s quay and land plays an important role in vessel turnaround time and cargo dwell time.** Productivity, however, can be constrained by bottlenecks, which usually lie in quayside operations the most expensive element of overall costs. Sometimes, the bottleneck is also due to yard layouts. **Indian container terminal operators are lagging behind their international peers in operational efficiency, in terms of Twenty-foot Equivalent Unit (TEU). JNPT is the only major Container Terminal in BMEC region.** Best practices at **International Ports indicate a range of 1500 to 2500 TEUs/Quay Meter/ Yr, except JNPT which is around 1639 TEUs/Quay Meter/ Yr, all**

other India Ports with Container handling facility are far below 1500. The productivity of the Crane i.e. **TEUs handled per Crane is also much below the International Standard of around 1.70 to 2.0 lakhs TEUs/ STS Crane/ Yr, except Chennai & JNPT all other ports are below 1.5 Lakhs TEUs/ STS Crane/** Yr. Similarly the **spacing of the Cranes are above internationally average spacing of around 80 to 120 meters.** Except JNPT, all ports have crane spacing above 120 meters.

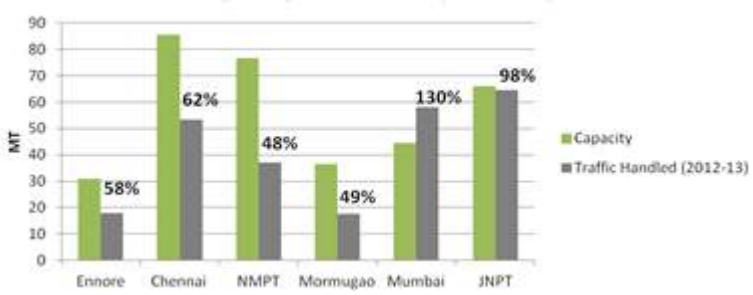
Figure: Comparative Assessment of Quayside Productivity



Source: NTDP Report, 2013

UTILISATION CAPACITY OF PORTS:

Figure: Utilisation Capacity of Major Ports of BMEC region & India, 2012-13



Source: Indian Ports Association, Analysis- Egis

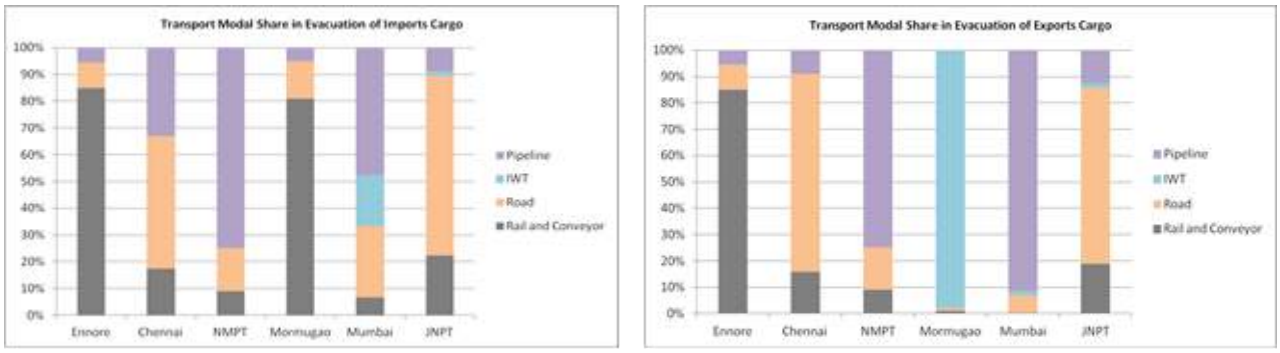
Utilization Capacity of the Ports is one of the Major Indicators **of Port's efficiency**. As per international standards a port should not have a utilization of more than **70%. i.e. the Port's capacity to handle traffic should be 30% more than the total traffic handled.** On an average **Capacity Utilization of India Ports is around 80%. JNPT operates with 98%** utilization &Mumbai port is 130%. This situation illustrates the strained status of India Ports. However, some the major ports like **NMPT &Mormugao are currently being utilized far below its level of 50% which is well below the acceptable level of 70%.** This also indicates the potential for these ports to handle more traffic and also highlights the issue of connectivity.

MODAL SHARE OF EVACUATION TO & FROM HINTERLAND:

As per international best practices its observed that the modal share of cargo evacuation play a key role in successful operation of the port. Direct Rail & Road connectivity to ports is a key component. China have a modal share of 63% of cargo from ports evacuated through Rail & around 28% through Road **&** all US ports have a modal share of 52% by Rail & 39% by road**.** Majority of the India Ports have a share of less than 20% for Rail based evacuation which far below, when compared to China & US. In the region **JNPT's rail sharer is around 22% and NPMT's share is around 9%. Even**

the modal share by road is only 16% for NMPT. NMPT's poor connectivity to hinterland is one the components which directly affects its efficiency.

Figure: Transport Modal Share of Major Ports of the Region & other Indian Ports: Imports & Export Cargos

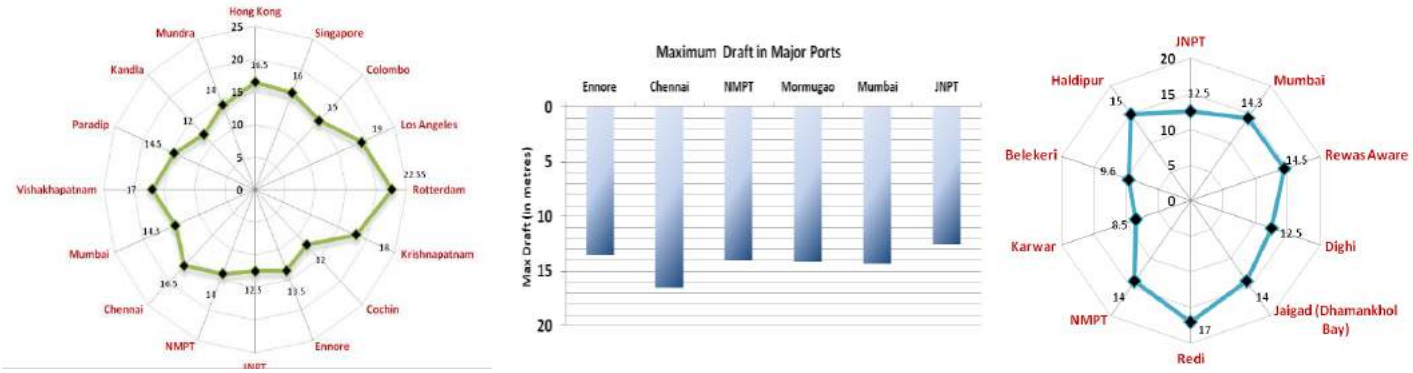


Source: NTDP Report, 2013

DRAFT & SHIP SIZE:

Deeper draft ports are required to handle larger and new generation of vessels which in turn is more economically for shippers. Most of the major Indian ports have proposals to improve their draft. The Eastern Coast of India is lined with ports with better draft facilities as compared to the ones on the western coast. The deepest draft port in India is Krishnapatnam (18m draft) closely followed by Vishakhapatnam (17m) and Chennai (16.5m). **The Ports along the western coast of BMEC region have its maximum draft ranging around 14m.** A **14 m draft can handle only Panamax Vessel & Handy vessels with a Draft of 12 meters & 10 meters** respectively which can handle only 70,000 to 80,000 and 35,000 to 45, 0000 dwt respectively. **However, none of these ports can handle Cape Size vessels with a draft of 18 meters under its full load of around 180,000 dwt.** Some of the proposed ports of Maharashtra region like **Redi & expansion of NMPT in Karnataka proposed to have 18 meters. Lack of deeper draft along BMEC region is an issue to be addressed in the near future& in order to make the ports of this region more competitive and to serve the future demand of BMEC, all major ports & planned new ports should have 18 meters of draft.**

Figure: Comparative assessment of Draft (in metres) of Ports of the Region, Country & International Ports



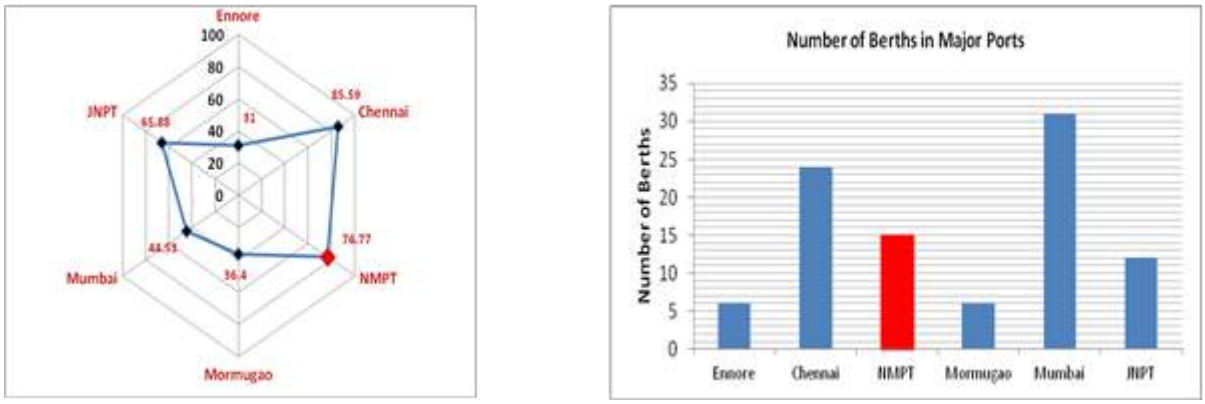
Source: Respective Port websites & Port Trust Websites, Maharashtra Maritime Board; Annual Reports of Ports, Karnataka

CAPACITY & BERTH:

The capacities of some of the major ports in the country are given in the following graph. It can be observed that among the ports considered **NMPT has a better Port Capacity (76.77 MT per annum)**

than other ports in the region like Mormugao, Ennore, JNPT & Mumbai only Chennai has slightly larger capacity than NMPT.

Figure: Comparative assessment of Port Capacity & Berths at Ports of the region with east coast ports



Source: Respective Port Trust Websites, Indian Ports Association,

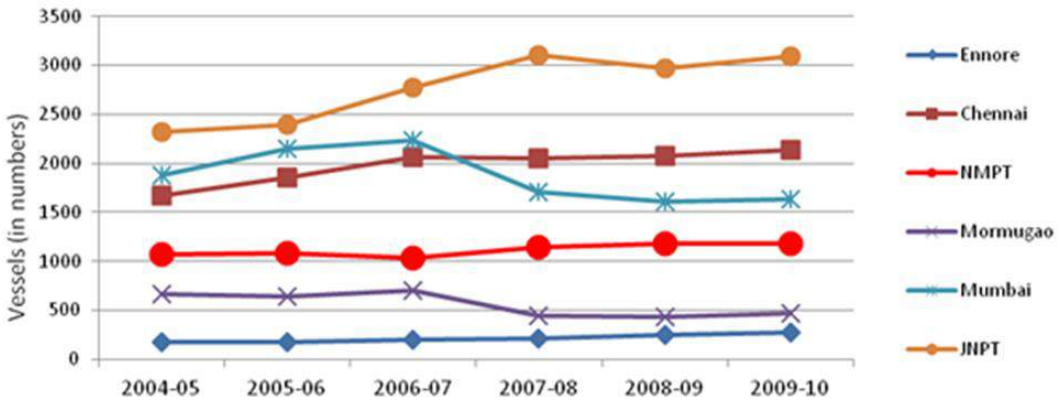
However, as discussed in the previous section, when we assess the Utilization Capacity of the Ports Mormugao & NMPT are utilized less than 50% of the capacity and the ports like JNPT, Mumbai & Chennai handle more than 80% & ports like JNPT & Mumbai even exceeds 100%. **This is predominantly due to poor connectivity of NMPT & also due to the fact that ports like NMPT & Mormugao lack large Container handling facilities.**

This assessment indicate that **Mumbai port has the maximum berthing facility with 31 berth under various categories, followed by Chennai & NMPT which has more than 20 berths & around 15 berths respectively.** With only 12 berths, JNPT has relatively less number compared to Mumbai & NMPT. Although JNPT has less number of berths, the volume of traffic handled (as illustrated above) and number of vessels handled is much higher than Mumbai, NMPT & Chennai. The same is illustrated in the next section.

VESSEL TRAFFIC:

The illustration below provides details of the vessel traffic per annum in the major ports. As per this assessment, **JNPT, Chennai & Mumbai ports handle more than 1500 vessel in** year with JNPT handling more than 3000 vessels, which almost triple the traffic handled by NMPT is sharp **difference between the ports in the same region is predominantly due to connectivity & container handling infrastructure at ports.**

Figure: Vessel Traffic per annum of major ports



Source: Indian Ports Association

GROWTH RATEOF TRAFFIC HANDLED:

Growth rates of cargo traffic handled at major ports are presented in the below table. Mumbai and NMPT are handling cargo with a positive growth rate of 2% and 6.3% respectively in the year 2013-14, but JNPT-Jawaharlal Nehru Port is handling cargo with a negative growth rate of 3.3% in the year 2013-14, this scenario is predominantly due to increase in Turnaround time & Cargo Dwell time & availability of improved infrastructure facilities of Gujarat ports. Mormugao port has seen a sharp decline which is attributable to ban on Iron Ore exports.

Table: Growth rate of traffic handled by Major Ports of BMEC Region

MAJOR PORT	Growth Rate						
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
MPT - Mormugao	2.60	18.70	17.20	2.50	-22.00	-54.70	-33.70
MbPT - Mumbai	8.90	-9.10	5.10	0.10	2.90	3.30	2.00
JNPT - Jawaharlal Nehru Port	24.60	2.60	6.10	5.80	2.20	-1.90	-3.30
NMPT - New Mangalore Port	12.40	1.90	-3.20	-11.20	4.40	12.40	6.30

Source: Indian Ports Association

HINTERLAND COVERAGE:

As per the assessment it was observed that the captive hinterland of the western coast ports other than JNPT & Mumbai is comparatively much smaller than the other ports. In fact, the reach of non captive hinterland of Vizag, Chennai & even to some extent Cochin ports covers potential hinterlands of western coast ports like NMPT. Apart from NMPT, all non major ports of Maharashtra are also facing the same problem. The Captive hinterland of JNPT & Mumbai is much larger the non major ports of this region are not able to establish their hinterland. One of the prime reasons for this situation is lack of proper connectivity (Road & Rail) between the ports & its hinterland.

Map: Captive and Non Captive Hinterland of Major Ports

Source: Secondary Sources, Mapping and analysis- Egis

Overall Comparison of Key Port Parameters

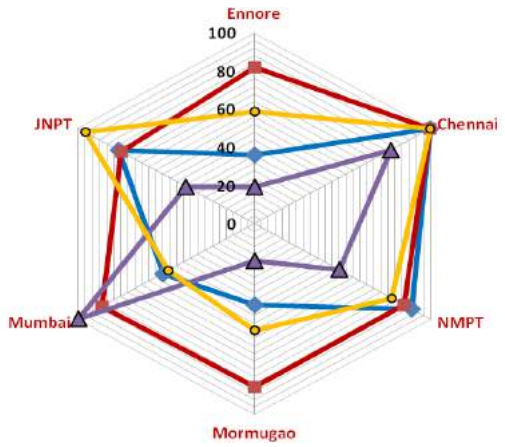


Figure 13-1: Comparison of Major Ports

Capacity (in MT) (Max Value: 85.59 MT)
Max. Draft (in metres) (Max Value: 16.5)
Number of Berths (Max Value: 31)
Average Turn Around Time (in days) (Min Value: 2.47)

**The maximum value for each indicator is taken as 100%.*

The radar graph below shows the performance of the major ports considered with respect to some of the major indicators discussed in the previous sections. **It can be seen that the New Mangalore Port performs relatively better in terms of, Total Capacity, Capacity Utilization, Draft, Berths, Turn Around Time, Per Berth Detention time, etc. as compared to the other major ports like Mormugao, JNPT, Mumbai, Ennore etc. However, issues like Modal share of evacuation i.e. Road & Rail Connectivity, Longer Travel time due to lack of proper Port Connectivity, Quayside evacuation with**

Carne facility remains as major issues when compared to ports of JNPT, Kandla, Chennai, Vizag etc. These issues will be the crucial for all other ports expected to serve the BMEC region.

13.4.3 Port connectivity

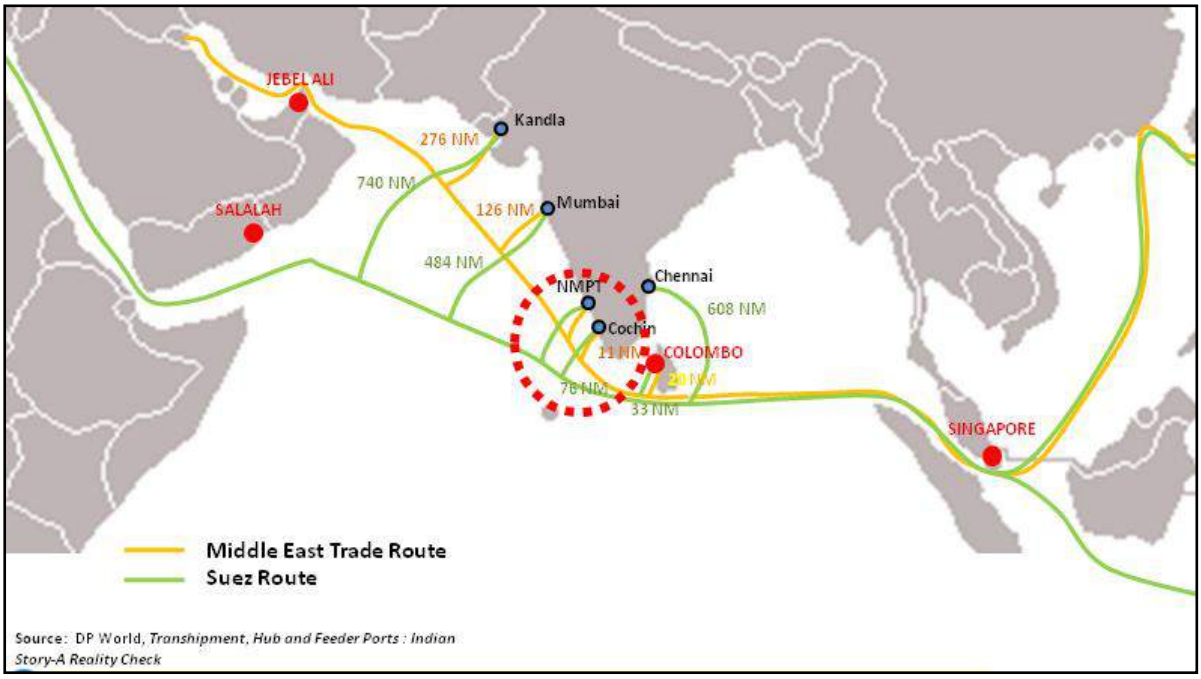
Connectivity to ports is a major infrastructure which would facilitate the ports performance & attractiveness and this is one of the major components for all Western Coast ports as Western Ghats acts as a major physical barrier. This part of the chapter elaborates the existing transport connectivity infrastructure to the ports of BMEC region and its issues. The following map indicates the assessment on the level of existing connectivity between the BMEC districts and the major ports

Map: BMEC Ports Connectivity

Source: Ministry of Shipping, NHAI, SWR, CR, Konkan& WR, PWD, GoI, MMB, Mapping and analysis- Egis

13.4.4 Identification of Major issues & Bottlenecks

Figure: Map showing locational advantage of BMEC Ports & other Indian ports with respect to International shipping routes



As can be observed from the analysis, although the ports of BMEC region (other than JNPT & Mumbai Ports) are located in close proximity to the international trade route, also has relatively better performance parameters, **like and has the potential to act as the prime port infrastructure of the country & also to act as international transhipment terminal, these ports does not attract vessels and handle relatively less traffic.** This indicates the need for further improvement & strengthening of the port and its allied infrastructure for the vibrant economic growth of the region. This part of the chapter, identify the key bottlenecks and issues which needs to be addressed to improve the competitiveness of BMEC ports & to meet global standards to make them internationally recognized maritime trade hubs.

Inefficient Connectivity between Ports & Hinterland

Transport Connectivity to the Ports is identified as one of the major bottle necks for the ports of BMEC region and needs to be addressed on priority basis:

- In the case of NMPT, though the capacity of the port is much higher that of Mumbai and JNPT (76.77 MTPA), the traffic handled does not indicate a correspondingly high value. Even though NMPT has recent proposals to improve draft and add specialized berths, **the poor connectivity to the port is one of the major bottle necks to its growth.** In such a situation, the obvious preference of shippers are JNPT, Mumbai, Ports of Gujarat or eastern coast ports like Chennai or Krishnapatnam which are better connected to the hinterland, providing better facilities and draft.
- Though NMPT has direct road and rail networks, its hinterland connectivity is not efficient owing to the bottlenecks in the Western Ghats. The stretches along the Shirdi Ghat are inadequate to handle container trucks. The single line rail link between Bengaluru to Mangaluru via Ghat sections of Sakaleshpura and Subrhmanya Road cannot handle heavily

loaded freight movements and has to move slowly. Further, lack of direct link between Bengaluru to Hassan which is currently connected through Mysuru also delays the travel time. Widening of the Ghat roads and doubling the rail lines are priority requirements to improve connectivity to ports.

- In the absence of direct rail link from Ballari to Karwar& other Minor ports of western coast of Karnataka, acts as a major disadvantage of the region & due to which iron ore is being exported through Goa port, Chennai port & Vizag ports. Construction of new rail link between Hubballi to Ankola would promote goods movement to Ports of Karnataka and would facilitate development of Greenfield ports like Tadri.
- Due to the presence of Western Ghats, National Highways NH-4 and NH-17 are not connected at necessary locations & at equal intervals. Connectivity between these two NH needs to be augmented through developing new links through tunnels/ widening the existing links.
- The main issue that needs to be addressed in case of Maharashtra Ports is the connectivity between NH4 and NH17 & last mile connectivity from NH 17 to the ports needs further improvements for better hinterland connectivity.

Lack of Dedicated Berths

The lack of dedicated berths for various categories of cargo and lack of efficient mechanization lead to poor performance of indicators like, turnaround time and pre berth detention time as well. These issues need to be addressed as soon as possible for encouraging more vessels to call at these ports.

Lack of Deep Drafts

Another important aspect which needs to be addressed is the increase in maximum draft of the ports. The average draft of the ports along the western coast is only around 14m. There are proposals to increase the draft (NMPT to 18m, Redi 17m etc) in order to accommodate large vessels and promote economies of scale. The new ports like Redi are also proposed to be deep draft ports.

Lack of Container Terminal

Adding of port infrastructure opens the region to greater global trade. The lack of an efficient large scale container handling facility in the region is a major setback of the region. The containers handled by NMPT and Mormugao together are less than one lakh TEUs per annum. Apart from the possibility to expand the NMPT into a transhipment hub, new deep draft, mechanized and efficient ports also needs to be developed in the region.

13.4.5 Forecasts and Need for Enhancement of Port Infrastructure for BMEC Region

Total Traffic and Capacity Forecasts

The total traffic handled over the years by the major ports in the BMEC region and some of the other fast growing ports in the country were analyzed and found that the growth rate of JNPT & Mumbai ports are around 3% and Paradip has it around 5% which is highest among the major ports considered for this analysis. Some of the recently developed non major ports like Kandla have around 6.7% & Mundra have it around 19.48%. However, NMPT's growth rate is only around 0.23%. The same is illustrated in Table.

Table: Total Traffic Handled by Ports recording High CAGR in India

Ports	2008-2009	2009-2010	2010-11	2011-12	2012-13	CAGR(2009-13)
NMPT	36.69	35.53	31.55	32.94	37.04	0.23
Mumbai	51.88	54.54	54.59	56.19	58.04	2.85
JNPT	57.29	60.75	64.31	65.73	64.50	3.01
Kandla	72.23	79.50	81.88	82.50	93.62	6.70
Paradip	46.41	57.01	56.03	54.25	56.55	5.06
Mundra		40.30	51.68	64.00	82.13	19.48

Source: Indian Ports Association website

Traffic projections based on different growth rates (CAGRs) are carried out to arrive at the most probable CAGR and projected traffic. For each of the growth rate considered, two sets of computations are done, one with 2008-09 as the base year and the other with 2012-13 as the base year. This is carried out in order to get a range of values for projected traffic with the same CAGR. The projected traffic with 2008-09 is expected to be higher than with 2012-13 as base year, since the 2008-09 traffic handled in the ports (BMEC Ports) is much higher owing to the large quantities of iron ore exports. By 2012-13 the traffic handled has reduced in most of the ports in the region as a result of the ban on iron ore exports. The different CAGRs considered for the projection are 4%, 6% and 7.42%. Justification for assuming these CAGRs is explained in the subsequent paragraphs.

Assumptions on Growth Rate projections:

However, with 4% CAGR the traffic volumes achieved at 2041 are around 249-371 MT which is much lower than or just close to the capacity additions already planned by the Ports of Karnataka & Maharashtra coasts for the year 2020-22. Hence, 4% CAGR cannot be considered as an optimistic or a BIS scenario for BMEC ports. In order to arrive at a more optimistic CAGR of above 4%, the average of some of the rapidly growing ports of the country are considered, for which average CAGR of Kandla and Paradip ports were considered, which comes to approximately 6%.

Considering the following facts

- projected growth rate of Port development at Karnataka State as per the Draft Infrastructure Policy for 2020 is around 9.14%
- capacity addition planed for NMPT, other minor ports & Greenfield Port at Tadri till 2022 is around 11.06 %.
- the capacity addition planned by the non-major ports of Maharashtra is @ 29% (2013-2017) and 11.98 % till 2025-2032.
- And considering the planned industrial development across BMEC, with an estimated growth rate of Secondary Sector of around 8 to 9%, the export & import volume demand of the region is expected to growth higher than 6%

Considering the above, the growth rate can range between 9% to 12%. However, these growth projections are short-term (5 to 10 yrs) and are not expected to have a steady growth rate for long term planning. Hence, an optimal BIS scenario above 6% but less than 9% shall be considered. The average CAGR of the Mumbai, JNPT, Kandla and Paradip *(major ports of the region and fast growing non major ports in the country)* as well as of the rapidly growing Mundra port is considered, comes

to 7.42% and this can be benchmarked for an optimal BIS growth rate. The following table gives the projected traffic handled in 2041 with the above mentioned CAGRs with different base years.

Table: Projected Traffic Handled with Alternate CAGRs

CAGR	Projected Traffic Handled (in MT), 2041			
	Karnataka	Maharashtra	Goa	Total
4% CAGR (BY 2012-13)	113	73	63	**249**
4% CAGR (BY 2008-09)	146	37	188	**371**
6% CAGR (BY 2012-13)	192	124	108	**424**
6% CAGR (BY 2008-09)	269	67	346	**682**
7.42% CAGR (BY 2012-13)	279	180	156	**615**
7.42% CAGR (BY 2008-09)	411	102	412	**926**

As per the planned capacity addition, the total capacity of the ports of the BMEC Region by comes to 484 MT (2022-32) , of which 110 MT will be of Karnataka ports, 314 MT of Maharashtra Ports and 60 MT of Goa Ports (the details of which are explained in the subsequent sections). As explained above these capacity additions are planned expecting the increase in port traffic much higher than 4% CAGR (249 MT and 371 MT). Hence, 7.42 % growth is assumed as more appropriate BIS growth rate for BMEC ports. However, there can be two scenarios on the projection based on the base years, if we assume the traffic volumes of 2008-09, then we get a traffic volume of 926 MT and with 2012-23 values we get 615 MT. If we assume modest BIS of 6% then, with base year of 2008-09, we get 682MT, which is much closer to the traffic volumes projected with 7.42% with 2012-13 as base. Keeping this in purview, a range of 6% to 7.42% growth rate is assumed for projecting the traffic volumes for next 25 years. The following table gives the state wise growth in traffic handled over a five year interval till the target year 2041.

Table: Projected Traffic Handled in BMEC Ports

Projected Traffic Handled in MT (6 to 7.4% CAGR)						
State/Year	**2017**	**2022**	**2027**	**2032**	**2037**	**2041**
Karnataka	66-74	89-106	119-151	159-216	213- 309	269-412
Maharashtra	17 -18	22 - 26	30- 38	40 - 54	53 - 77	67 - 102
Goa	74 - 85	106 - 114	151- 153	205- 216	274- 309	346- 412

Note: the above figures are excluding the Mumbai and JNPT Ports

Table: Total Traffic Handled in BMEC Ports in 2041

Total Traffic Handled	Excluding Mumbai and JNPT	Including Mumbai and JNPT
2012-13	**79.54 MT**	**202.05 MT**
Projected for 2041 with 6% to 7.42% CAGR	**682 to 926 MT**	**1386 to 2124 MT**

Source: Indian Ports Association website, Analysis-Egis

Projected Demand and Planned Capacity

As per the projected forecast, there is demand to increase the capacity of BMEC region to meet the projected traffic demand of **926MTPA by 2014.** The existing capacity of the Port is around 163 MTPA and is expected to go up to **484 MTPA** by 2022-2032. This would be achieved by various expansion plans planned by the existing Major and Non Major Ports. The total capacity of the BMEC ports as per the expansion plans planned by respective ports is 484 MT. Even with these expansion plans, there is expected to be a gap of 442 MTPA. Thus the capacity gap will have to be met by additional Greenfield ports or by increasing the capacity of the existing ports.

Table: Total Capacity of BMEC Ports when fully operational

BMEC Ports	Expected Capacity when fully operational (MMTP)
NMPT	100
Mormugao	60
Dighi	90
Jaigad	50
Redi	33
Vijaydurg	75
Haldipur	10
Rewas Aware	66
TOTAL CAPACITY	**484 Million Tonnes**

Source: Respective Ports Websites.

**The projection are preliminary based on data made available and are expected to change based on updation.*

The state wise planned capacity till 2041 is tabulated below. Since the current proposals are made only till 2022 or 2016 for most of the ports, the same capacity has been considered till the target year of 2041.

Table: State Wise increase in Capacity, Traffic Handled and Gap, BMEC Region

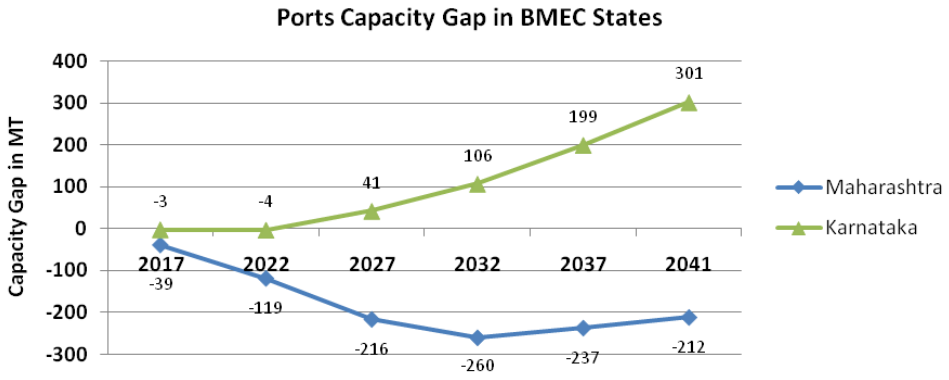
Ports	2017	2022	2027	2032	2037	2041
Karnataka						
Total Capacity	77	110	110	110	110	110
Projected Traffic Volumes (6% to 7.4%)	**66-74**	**89-106**	**119-151**	**159-216**	**213- 309**	**269-411**
Gap	**-11 to -3**	**-21 to -4**	**9 to 41**	**49 to 106**	**103 to 199**	**159 to 301**
Maharashtra						
Total Capacity	**57.5**	**145**	**254**	**314**	**314**	**314**

Projected Traffic Volumes (6% to 7.4%)	**17 -18**	**22 - 26**	**30- 38**	**40 - 54**	**53 - 77**	**67 - 102**
Gap	**-41 to -39**	**-123 to -119**	**-224 to -216**	**-274 to -260**	**-261 to -237**	**-247 to -212**
Goa						
Total Capacity	**36**	**40**	**50**	**50**	**60**	**60**
Projected Traffic Volumes (6% to 7.4%)	**74 - 85**	**106 - 114**	**151- 153**	**205- 216**	**274- 309**	**346- 412**
Gap	**37 to 49**	**66 to 74**	**101-103**	**155- 166**	**214- 249**	**286- 352**
TOTAL CAPACITY BMEC	**170.9**	**295**	**414**	**474**	**484**	**484**
Total Projected Traffic Volumes of BMEC (6% to 7.4%)	**157-177**	**217-246**	**300-342**	**404-486**	**540-695**	**682-926**
Gap	**-14 to 6**	**-78 to -49**	**-114 to -72**	**-70 to 12**	**56 to 211**	**198 to 442**

Source: Port Websites and other Secondary Sources, Analysis- Egis

As can be seen from the following graph, the capacity gap in Karnataka is steadily increasing over the years, indicating a demand for Greenfield ports as well as increasing the capacity for the existing ports. The planned capacity addition in Non Major Ports of Maharashtra (excluding JNPT & Mumbai Ports) is satisfactory & actually is available in excess, which can cater to the growing demands of Mumbai Port which does not have land available for future expansion. Further, these ports can also cater to the demands of Goa port which also has its own limitations for expansion and development of Greenfield mega ports.

Figure: Projected Port Capacity Gap in BMEC States



Source: Indian Ports Association, Other Secondary Sources, Analysis- Egis

Iron Ore and Coal Traffic Forecasts

The major ports handling iron ore in the region are NMPT and Mormugao and the minor ports of Karnataka, Karwar and Belekeri. With the iron ore export ban in 2010, the traffic handled in these ports has drastically reduced. In order to project the expected iron ore handled in these ports the CAGR of iron ore traffic handled in these ports from 2001-09 has been considered, which is considered to be peak period of iron ore exports, the average of which comes to around 9.2%.

However considering the fact that BMEC region would have steel manufacturing industries which will increase the local consumption of iron and export of iron ore will relatively reduce, an average CAGR of 6% is assumed for projecting the 2041 iron ore traffic from BMEC Ports. **The following projections indicate that 37% of the total estimated traffic would be Iron Ore exports amounting to 291.44 MT at 2014.**

Iron Ore Traffic Projected to 2041 (with 6% CAGR)	**291 MT**
Total Traffic Projected in 2041 (7.42% CAGR)	**926 MT**
Percentage of Iron Ore Traffic	**31%**

Comparing this with the Iron Ore traffic during the peak period i.e 2009

Iron Ore Traffic in 2009	**47.86 MT**
Total Traffic in 2009	**83.24 MT**
Percentage of Iron Ore Traffic	**57.5%**

Thus expecting a high share of iron ore traffic by 2041, there is a requirement for **increasing the iron ore handling capacity of existing ports or creating dedicated iron ore handling ports in the region.**

Demand for Coal Imports towards Power Demand

Based on the preliminary power estimates, the additional capacity of Coal based thermal power plan is around 29,000 MW by 2041. This demands around 160 MTPA of coal. Assuming at least 50% of this demand has to be met through imports; **the additional port capacity projected for the region's ports should at least have a capacity of around 80 MTPA only to handle the Coal requirement for BMEC's power sector, by 2041, which would be around 8.6% to 11.7% of the total estimated traffic handed in the region.**

13.4.6 Proposed Port Perspective Plan

As it is evident from the capacity gap graph, the major proposals, with respect to developing Greenfield ports as well as expansion of existing port capacities, are required in Karnataka. This along with improving the existing connectivity to the ports is also necessary. In case of Maharashtra, as mentioned earlier, though the capacities of expanded and new ports would be sufficient to meet the traffic demand, the connectivity to these ports is the major issue. Dry docking and ship building facilities are not available along the Indian coast. Vessels often visit shipyards in Singapore for dry docking, while dredgers, tugs and cruise boats go to Colombo for repairs due to non-availability of dry docks in the Indian coast. Considering this, the same can be proposed in any of the BMEC ports

based on detailed study and survey. Considering these factors, some of the broad preliminary proposals of the port perspective plan for the BMEC states are as follows.

Karnataka

I. Proposals to Increase Capacity

Considering the necessity to increase the overall port capacity of Karnataka, the broad proposals for the same based on preliminary estimates & projections are:

1. **Developing all weather Multipurpose Greenfield Ports at Tadri & Haldipur with a capacity of around 100 MT each by 2032 & 2041 respectively. Both ports to have a draft of 18 meters.**
2. **One of the two ports (Haldipur or Tadri) to be developed as Mega Port with Transhipment facilities, Dry-docking & Ship Building facilities**
3. **Expansion of NMPT to a capacity of 150 MT by 2041, with draft up to 18 m & exclusive Container Terminal. Expansion to be planned by exploring integration with Old Mangalore port**
4. **Expansion of Karwar Port to facilitate handling traffic of around 30MT by 2041. Northern Breakwater and development through reclamation of sea shall be explored.**
5. **Developing Belekeri as a dedicated iron ore handling port**
6. **Expansion of Honnavar Port**
7. **Development & Expansion of Manki Port**

The following table illustrates the projected demand, Gap & additional capacity planned at a gap of 5 years, through expansion of existing port facilities and through Greenfield ports across Karnataka region.

Table: Projected Traffic, estimated gap & recommended on additional port capacity, Karnataka

Year	2017	2022	2027	2032	2037	2041-42
Karnataka						
Total Capacity (in MT)	77	110	110	110	110	110
Projected Traffic Handled	**66-74**	**89-106**	**119-151**	**159-216**	**213- 309**	**269-411**
Gap	**-11 to -3**	**-21 to -4**	**9 to 41**	**49 to 106**	**103 to 199**	**159 to 301**
Proposed / Recommended additional capacity (@ 7.4%)			Phase I of Tadri Port 49 MT	Phase II of Tadri (as Mega Port) with additional capacity of 51MT	Phase I of Haldipur 50 MT and additional expansion of Karwar and Belekeri, 27.96 MT	Phase II of Haldipur, 50 MT, Expansion of NMPT with additional capacity of 50MT and another 23.79 MT through expansion of Manki, Karwar, Honnar and Belekeri
Proposed / Recommended additional capacity			Phase I of Tadri or Haldipur Port	Phase II of Tadri or Haldipur(as Mega Port)	expansion of Karwar and Belekeri, 27.96 MT	with additional capacity of 10MT &another 23.79 MT through expansion

(@ 6%)			49 MT	with additional capacity of 51MT		of Manki, Karwar, Honnar and Belekeri

Estimated Costing for Port Development

The following table gives the estimated cost for port development as per the projected traffic handled in the Karnataka Ports. It is to be noted that this includes the cost of only the port; the cost of developing the port connectivity is mentioned in the roads perspective section of the report.

Table: Estimated Costing for Karnataka Ports

Year	2017	2022	2027	2032	2037	2041
Projected Traffic Handled (6 to 7.4% CAGR)	-	-	**9 to 41**	**49 to 106**	**103 to 199**	**159 to 301**
Estimated Cost (in Rs. Crores) (6 to 7.4% CAGR)	-	**4410**	**4590**	**2097 to 6597**	**2684 to 10784**	-

Source: Egis

II. Proposals to Improve Connectivity

As emerged predominantly throughout the assessments of key efficiency parameters, port connectivity is the major issue for all ports located along the BMEC region. With western Ghats being the major physical barrier, Road & rail connectivity to the ports across western ghats is a major challenge and without this infrastructure, the perspective planned for Ports to promote industrialization at BMEC would not be achievable. Some of the major proposals to improve connectivity are

1. **Integrated Transport Tunnel at Shiradi Ghat: An integrated tunnel for road &rail, which will reduce the travel distance & time and also minimize the impact on the Western Ghats is a much needed transport infrastructure to enhance the port connectivity. There is already a proposal prepared by JICA to construct an 18.50 km multi-stage 4 lane tunnel route through the Western Ghats between Gundya in Dakshina Kannada and Sakleshpur in Hassan district.** This project is expected to improve the connectivity to NMPT and considering the long term plan of BMEC, the perspective plan recommends its implementation.

2. **Direct & Doubling of Bengaluru- Mangaluru Rail link:** Currently the rail link between Bengaluru to Mangaluru is via Mysuru, the direct line between Bengaluru to Mangaluru is under construction and the same needs to be made double line till Mangaluru to facilitate freight movement across the Ghats section. As mentioned above integrating tunnel proposal will facilitate the rail connectivity also.

3. **Hubballi – Ankola rail link**: Hubballi- Ankola Rail link is one of the major port connectivity proposals which needs to be implemented to facilitate port connectivity between the Ballari

region and the northern ports of Karnataka comprising Karwar, Belekeri & Proposed port at Tadri. This link would also link the Ballari region directly to Konkan line which facilitates import of coal or steel plants & proposed thermal power plants. With proposed node development at Hubballi, Belagavi, Ballari& Haveri region, this link is a very important link between the planned BMEC region & the proposed port development. Expansion of NH 63 into 4 lane over a period of time is also recommended to enhance the port connectivity.

4. **Thalaguppa- Honavar rail link:** Linking with the Konkan Rail line with BMEC, this line of around 80 km would be necessary to develop the Honnavar Port, Haldipur & Tadri ports and its planned link to BMEC region connecting Chitradurga & Davanagere districts.

5. **Four Laning of NH 206 and NH 17:** for improved connectivity of the ports with the hinterland.

6. **Double Laning of Haveri- Sirsi- Kumta:** To enhance connectivity between NH 17 and NH4 at Haveri district of the BMEC region to facilitate direct connectivity to ports.

7. **Connectivity Improvement to cater to Iron Ore Traffic: Iron** ore transported through road connecting Ballari and Goa (NH 4A) is proposed for improvement which also connects NH-4 at Dharwad, Gadag, Proposed Expressway, Koppal and NH-13. Iron ore also transported through road connecting with Ballari, Chitradurga and Mangaluru.

Estimated Costing & Phasing for Port Connectivity Projects, Karnataka

The following is the list of port connectivity (Rail, Road & Tunnel) projects envisioned within Karnataka part of BMEC and its estimated cost.

Table: Phase wise road connectivity projects with investment, Karnataka

KARNATAKA								
S.no	**Road**	**Sections**	**Connectivity**	**Current number of lanes**	**Proposed Lanes**	**Length**	**Cost per km (in Crores)**	**Total Cost (in Crores)**
2017 (Phase 1)								
1	NH 63	Hubballi-Ankola		2L	4L	132	Project Under NHAI	
2	NH 206	Tumakuru-Honnavar Port	NH-4 (Tumakuru)-Tiptur-Shivamogga-Honnavar Port	2L	4L	373	9	3357
3	NH 13	Chitradurga/Ballari-Mangaluru	NH-4 (Chitradurga) - Bhadravati - Mangaluru Port	2L	4L	313	9	2817
4	SH 71 & SH 71E	Tiptur - Hassan	Potential Node Hassan to NH-4 (Hassan-Tiptur-Tumakuru)	IL	2L+PS	53	5.5	292
6	SH-1	Thirthahalli - Agumbe	Malpe port to NH-206. NH-206 further connects to NH-4	IL	2L+PS	46	5.5	253
	SH-65	Agumbe - Malpe Port		IL	4L	43	11	473

7	SH-2	Haveri - SH-69 (Yekkambi)	NH-4 (Haveri) - Sirsi - Kumta/Belekeri Ports	IL	2L+PS	54	5.5	297
	SH-69	SH-69 (Yekkambi) - NH-17 (Kumta/Belekeri)		IL	4L	73	11	803
Total Cost of Phase 1								**8,292**
2022(Phase 2)								
1	NH 48	Bengaluru-Mangaluru		2L/4L	6L	353	Project Under NHAI	
2	NH 234	Sira-Mangaluru	NH-4 (Sira) - Banavara - Mangaluru Port	2L	4L	288	9	2592
Total Cost of Phase 2								**2,592**
2027(Phase 3)								
1	SH 71 & SH 71E	Tiptur - Hassan	Potential Node Hassan to NH-4 (Hassan-Tiptur-Tumakuru)	2L+PS	4L	53	6.5	345
2	SH-1	Thirthahalli - Agumbe	Malpe port to NH-206. NH-206 further connects to NH-4	2L+PS	4L	46	6.5	299
3	SH-2	Haveri - SH-69 (Yekkambi)	NH-4 (Haveri) - Sirsi - Kumta/Belekeri Ports	2L+PS	4L	54	6.5	351
Total Cost of Phase 3								**995**
Total Cost of Road Improvements in Karnataka State								**11,879**

Source: Egis

The following table gives the phase wise rail connectivity projects with their investment required, for Karnataka.

Table: Phase wise rail connectivity projects with investment, Karnataka

KARNATAKA				
Section	**Existing Lanes**	**Proposed Lanes**	**Length (km)**	**Total Cost (INR in crores)**
2017(Phase 1)				
Bengaluru-Hassan	None	DFC SPUR LINE	360	4860
Hassan-NMPT	BG Single Line	Double Line		
Tumakuruu-Arsikere-Hassan	BG Single Line	Double Line	142	1491
Kadur-Chikmaglur - Sakleshpur	None	Double line	102	1377
2022(Phase 2)				
Hubballi-Ankola		DFC SPUR LINE	167	3596
2027(Phase 3)				
Birur-Shivamogga-Talaguppa	BG Single Line	Double Line	151	1586

Talaguppa- Honnavar	None	Double line	74	999
Tinnaighat-Vasco da Gama	BG Single Line	DFC	108	1458

Source:Egis

The following table gives the phase wise tunnel and bridge connectivity projects with their investment required, for Karnataka.

Table: Phase wise tunnel/bridge connectivity projects (road/rail) with investment, Karnataka

KARNATAKA									
S.no	**Ghat section**	**Road/ Rail**	**Connectivity**	**Ghat Length (in km)**	**Tunnel/ Bridge**	**Approx Length (in km)**	**Proposed Lanes**	**Cost per km (in Crores)**	**Total Cost (in Crores)**
2017(Phase 1)									
1	Shiradi Ghat	NH-48	Mangaluru Port	46	Bored Tunnel+ Bridges	18.5	2 Lane	145	2683
2	Shiradi Ghat	Rail	Mangaluru Port	46	Bored Tunnel+ Bridges	18.5	2 Lanes	145	2683
3	Kodambale-Balekoppa	SH-69	NH-4 (Haveri) - Sirsi - Kumta/Belekeri Ports	6.5	Realignment or Tunnel Options need to be Studied in Detail				
2022(Phase 2)									
1	Shiradi Ghat	NH-48	Mangaluru Port	46	Bored Tunnel+ Bridges	18.5	2 Lane	145	2683

Source: Egis

The following table summarises phase wise investment required for the proposed port connectivity projects based on the project priority.

Table: Preliminary Investment Phasing of Port Connectivity Project (INR in Crores) ,Karnataka

State/Year	2017 (Phase 1)	2022 (Phase 2)	2027 (Phase 3)	2032 (Phase 4)	2037	2041
Investment required for Integrated Connectivity Projects Road	8292	2592	995	-	-	-
Investment required for Integrated Connectivity Projects Rail	7728	3596	4043	-	-	-

Investment required for Bore Tunnel/ Bridges projects	5365	2683	-	-	-	-

Source: Egis

Maharashtra

1. **Karad-Chiplun state highway connecting NH-4 to NH17is** seen as major Port Connectivity to connect the districts of Pune, Satara, Sangli to Ratnagiri and further it is expected to connect to Ports of Ratnagiri & the two ports of Jaigad. This 90 km stretch is very important and this State Highway needs to be upgraded to National Highway Standard.
2. **Karad- Chiplun broad gauge line**: A major link that needs to be developed to link Pune, Kolhapur to the BMEC Ports. While Karad is on the Pune-Kolhapur section of the Central Railways, Chiplun falls on the Konkan Railway route. When it gets developed, the route will link destinations like Pune and Kolhapur to the Konkan region and the BMEC ports. The **Kumbharli Ghat** pass across the Western Ghats range facilitates this link and the pass can be utilised to have a rail connectivity to facilitate port connectivity.
3. **Pune- Dighi Connectivity:** An appropriate connectivity between Pune & Dighi needs to be established to facilitate connectivity between the Industrial areas of Pune & Dighi Port. A tunnel across Western Ghats which would minimize the environment impact and would also minimize the travel distance shall be explored.
4. **Improving SH Connectivity between NH 4 and Maharashtra Ports:** The main issue of port connectivity for all Maharashtra ports is the connectivity between NH17 to the ports and connectivity between NH4 to NH17. There is number of SH which connect NH4 to NH17 & the ports which needs to be enhanced to 4 lane. **These SHs include SH99, 100, 102, 103, 104 105, 78, 180 & 179. Enhancing these state highways is one of the major port connectivity infrastructure which needs to be developed as part of this perspective pan proposal.**

Estimated Costing & Phasing for Port Connectivity Projects, Maharashtra

The following is the list of port connectivity (Rail, Road & Tunnel) projects envisioned within Maharashtra part of BMEC and its estimated cost.

Table: Phase wise road connectivity projects with investment, Maharashtra

ROADS								
MAHARASHTRA								
S.no	**Road**	**Sections**	**Connectivity**	**Current number of lanes**	**Proposed Lanes**	**Length**	**Cost per km (in Crores)**	**Total Cost (in Crores)**
2017 (Phase 1)								
1	SH-106	Nivali Fata (NH-17) - SH-4 (Undi)	NH-4 (Kolhapur) - via NH-204 - Nivali Fata -Jaigad Port	IL	2L+PS	37	5.5	204
	SH-4	SH-4 (Undi) - Jaigad Port		IL	2L+PS	5.5	5.5	30
2	SH-78	Karad - Chiplun Road	NH-4 to Dabhol Port	2L	-	90	-	-

	SH-78	Chiplun - Modka Agar (SH-4)		IL	2L+PS	42	5.5	231
	SH-4	Modka Agar - Dabhol Port		IL	2L+PS	19	5.5	105
3	SH-70	Shindewadi (NH-4) - Pandharpur Fata	NH-4 to Dighi Port	2L	-	108	-	-
	-	Pandharpur Fata - Gava Tala (SH-99)		IL	2L+PS	14	5.5	77
	SH-99 & MDR	Gava Tala - Dighi port		SL	2L+PS	53	8.5	451
4	NH-204	Kolhapur - Ratnagiri	NH-4 (Kolhapur) - Sakharpa - Ratnagiri Port	2L	4L	137	9	1233
5	MDR	Indapur on NH-66 to Rajapuri (Dighi port)	To Dighi port	IL	2L+PS	47.2	5.5	260
6	SH 105	Sawarde(NH17) to Jaigad Port (SH4)	To Jaigad Port	IL	2L+PS	47	5.5	259
Total Cost of Phase 1								**2,850**
2022 (Phase 2)								
1	SH-106	Nivali Fata (NH-17) - SH-4 (Undi)	NH-4 (Kolhapur) - via NH-204 - Nivali Fata -Jaigad Port	2L+PS	4L	37	6.5	241
	SH-4	SH-4 (Undi) - Jaigad Port		2L+PS	4L	5.5	6.5	36
2	SH-78	Karad - Chiplun Road	NH-4 to Dabhol Port	2L	4L	90	9	810
	SH-78	Chiplun - Modka Agar (SH-4)		2L+PS	4L	42	6.5	273
	SH-4	Modka Agar - Dabhol Port		2L+PS	4L	19	6.5	124
3	SH-70	Shindewadi (NH-4) - Pandharpur Fata	NH-4 to Dighi Port	2L	4L	108	9	972
	-	Pandharpur Fata - Gava Tala (SH-99)		2L+PS	4L	14	6.5	91
	SH-99 & MDR	Gava Tala - Dighi port		2L+PS	4L	53	6.5	345
4	MDR	Indapur on NH-66 to Rajapuri (Dighi port)	To Dighi port	2L+PS	4L	47.2	6.5	307

5	SH 105	Sawarde(NH17) to Jaigad Port (SH4)	To Jaigad Port	2L+PS	4L	47	6.5	306
8	SH-134	Sankeshwar (NH-4) - Tita	NH-17 to Redi Port	IL	2L+PS	63	5.5	347
	SH-180/SH-121	Tita - Sawantwadi		IL	2L+PS	37	5.5	204
	SH-123	Sawantwadi - Redi Port		IL	2L+PS	30	5.5	165
Total Cost of Phase 2								**4,221**
2027(Phase 3)								
2	SH-134	Sankeshwar (NH-4) - Tita	NH-17 to Redi Port	2L+PS	4L	63	6.5	410
	SH-180/SH-121	Tita - Sawantwadi		2L+PS	4L	37	6.5	241
	SH-123	Sawantwadi - Redi Port		2L+PS	4L	30	6.5	195
Total Cost of Phase 3								**846**
Total Cost of Road Improvements in Maharashtra State								**7,917**

Source: Egis

The following table gives the phase wise rail connectivity projects with their investment required, for Maharashtra.

Table: Phase wise rail connectivity projects with investment, Maharashtra

MAHARASHTRA				
Section	**Existing Lanes**	**Proposed Lanes**	**Length (km)**	**Total Cost (INR in crores)**
2017 (Phase 1)				
Karad-Chiplun- Jaigad port	None	DFC SPUR LINE	160	2160
2022 (Phase 2)				
Baramati-Lonand-Shirwal-Mahad-Dighi Port	None	Double Line	250	3275
2022(Phase 3)				
Belagavi- Sawanthwadi- Redi Port	None	Double line	122	1647
Pen-Thal	BG Single Line	Double Line	29	305
Thal - Rewas Aware Port	None	Double Line	20	510

Source:Egis

The following table gives the phase wise tunnel connectivity projects with their investment required, for Maharashtra.

Table: Phase wise tunnel/bridge connectivity projects (road/rail) with investment, Maharashtra

S.no	Ghat section	Road / Rail	Connectivity	Ghat Length (in km)	Tunnel/Bridge	Approx Length (in km)	Proposed Lanes	Cost per km (in Crores)	Total Cost (in Crores)
MAHARASHTRA									
2017 (Phase 1)									
1	Ghatmatha	SH-78	Dabhol Port to NH 4 (Karad town)	11.5	Bored Tunnel	4.5	2 Lane	160	720
2	Ghatmatha	Rail	Dabhol Port to NH 4 (Karad town)	11.5	Bored Tunnel	4.5	2 Lines	160	720
3	-	SH-105	Sawarde(NH17) to Jaigad Port (SH4)	-	Bridge	0.85	2 Lane	-	40
4	-	Rail	Sawarde(NH17) to Jaigad Port (SH4)	-	Bridge	0.85	2 Lines	-	40
5	Ambaghat	NH-204	Kolhapur - Ratnagiri	11.5	Realignment or Tunnel Options need to be Studied in Detail				
2022(Phase 2)									
1	Varandha Ghat	SH-70	Dighi Port to NH 4	6.1	Bored Tunnel	1.0	2 Lane	160	160
2	Varandha Ghat	Rail	Dighi Port to NH 4	6.1	Bored Tunnel	1.0	2 Lines	160	160
3	Harkol Kond	SH-99	Dighi Port to NH 4	2.6	Realignment or Tunnel Options need to be Studied in Detail				
4	-	SH-105	Sawarde(NH17) to Jaigad Port (SH4)	-	Bridge	0.85	2 Lane	-	40

Source: Egis

The following table provides phase wise investment required for the proposed port connectivity projects based on the project priority.

Table: Preliminary Investment Phasing of Port Connectivity Project, (INR in crores),Maharashtra

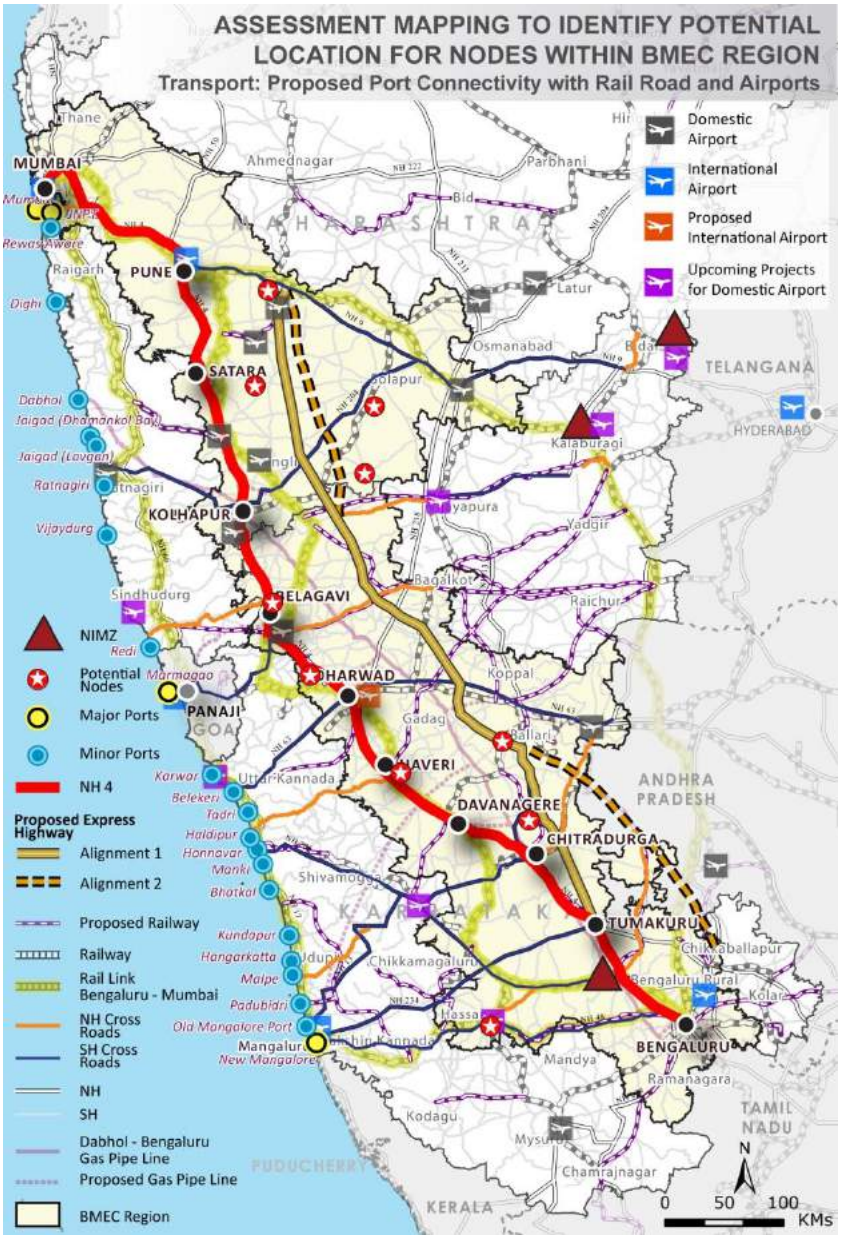
State/Year	2017	2022	2027	2032	2037	2041
Investment required for Integrated Connectivity Projects Road	2850	4221	846	-	-	-
Investment required for Integrated Connectivity Projects Rail	2160	3275	2462	-	-	-
Investment required for Bore Tunnel	1440	320	-	-	-	-

projects						
Investment required for Bridge projects	80	40	-	-	-	-

Source: Egis

Detailed Proposed Port Connectivity with Rail, Road and Airports is shown below.

Figure: Proposed Road & Rail Connectivity to Ports



Source: Egis

13.5AIRPORTS

13.5.1 Existing Scenario- Airport Infrastructure: Highlights

Airports are integral part of fast growing economy especially for the quicker transportation of goods. India is the 10th largest economy in the world and is also the ninth largest civil aviation market in the world. The Indian civil aviation market is all set to become the world's third largest by 2020. The passenger traffic reached 169 Million during FY 2013-14 having domestic share of 122.4 Million. During the same year, the domestic freight traffic was 0.84 million tonnes, while international freight traffic was at 1.44 million tonnes. The growth rates were respectively 6.1% and 4.1% for the passenger and freight traffic compared to the previous financial year.

- There are four international airports, 8 operational minor airports & 1 proposed airport within the BMEC influence area. The international airports are at Mumbai, Bengaluru, Mangaluru and Pune, however, including Goa it will be five.
- Mumbai airport shared 29% of total cargo being transported in India as per last financial year's record. The share of international cargo was 32.4% which is the highest compared to all airports. During the same year, Bengaluru airport handled 10.6% of total cargos while Mangaluru and Goa carried 0.02% and 0.2%.
- The growth rates of passenger traffic of these airports for the financial year 2013-14 were observed at be around 6.7% at Mumbai, 7.3% at Bengaluru, 12.9% at Goa and 23.0% at Mangaluru airport. Similar trends were observed for cargo movement also. Both growth trends are illustrated in the graph below.
- The average vertical distance between the existing airports in the zone is around 78 km. This will be reduced to around 45 km with the proposed airports in the area.
- Six new airports are up-coming in Maharashtra state, four in Karnataka and one in Goa. The airports proposed at Navi Mumbai in Maharashtra and Mopa in Goa are international. At the same time, the Government of Karnataka has taken initiatives to develop the existing Hubballi airport to international standards, and land acquisition processes are on-going. The list of upcoming airports is given below.
- For the efficient handling of air cargoes, Airport Authority of India is developing the existing facilities at major airports. As part of this project, he Air cargo complex at Mangaluru is completed and is in operations since May 2013. Goa airport will also be upgraded with better infrastructure facilities to handle the air cargoes.

Figure: Trend in Passenger Traffic at major airports

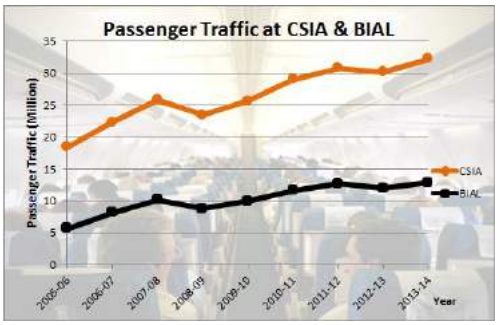
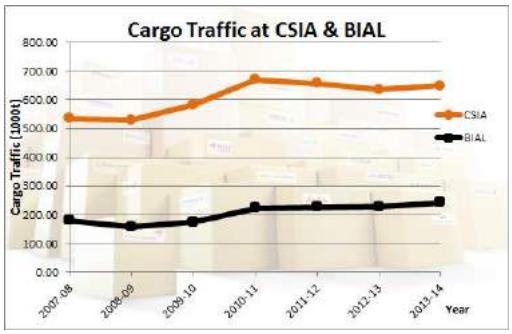
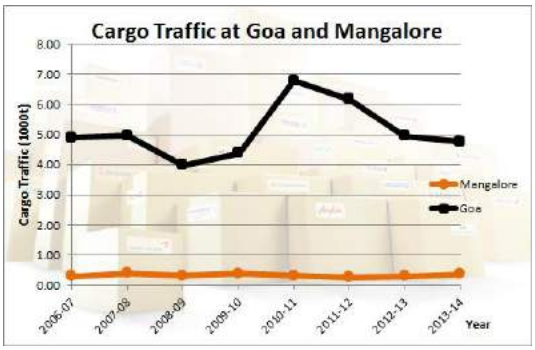


Figure: Trend in Cargo Traffic at major airports





13.5.2 Forecasts and Need for Enhancement of Port Infrastructure for BMEC Region

The forecasted of for both passenger & cargo traffic as per the projected estimates is given in the following tables:

Table: Air Passenger Traffic projections for 2025

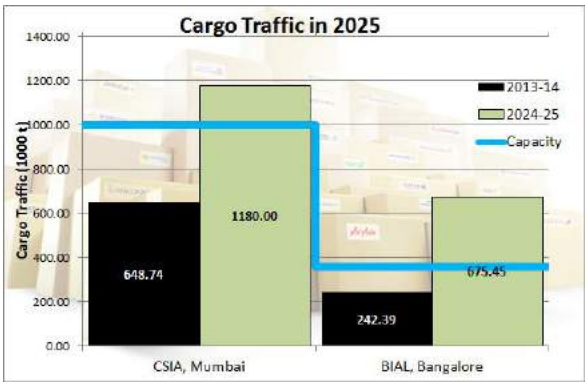
Airport	Passenger Traffic in 2013-14 (MMPA)	Passenger Traffic in 2024-25 (MMPA)	Capacity (MMPA)
CSIA Mumbai	32.22	65.86	40
BIAL Bengaluru	12.87	30.62	17
Mangaluru	1.28	4.79	12
Goa	4.00	14.55	7.5

As per the estimates, all airports except Mangaluru require capacity additions by the year 2025. Upcoming Navi Mumbai airport may help in diverting considerable traffic reaching Mumbai airport. Bengaluru airport capacity can be improved to 20 MPPA with minor modifications. However further expansion is also required. Similarly, a new airport at Mopa is under consideration of authorities and it will help to reduce the traffic at Goa.

Table: Air Cargo Traffic projections for 2025

Airport	Cargo Traffic in 2013-14 ('000 tonnes)	Cargo Traffic in 2024-25 ('000 tonnes)	Capacity ('000 tonnes)
CSIA Mumbai	648.74	1180.00	1000
BIAL Bengaluru	242.39	675.45	360
Mangaluru	0.37	0.91	3
Goa	4.77	7.47	2.8

Figure: Cargo Traffic Projections for 2025



Better infrastructure facilities are required at Mumbai, Bengaluru and Goa for handling the future cargoes. However, the main outcome of these projections is that these airports are getting strained and considering the long term perspective of BMEC region, there is a need for expanding the existing minor airports and development of Greenfield airports within the region. The same is proposed as part of this preliminary perspective for Airports Infrastructure of the region.

13.5.3 Proposed Airport Perspective Plan

In order to reduce the projected traffic demand at Mumbai, Bengaluru, Goa, Pune & Mangaluru airports and also to facilitate the passenger & freight movement due to the proposed Nodes/ Mega Cities & Smart Cities of the BMEC region, the region needs some Greenfield airports and upgradation of existing airports. The following section discuss the same

Hubballi International Airport

With Node development & Greenfield Mega city proposed at Hubballi- Dharwad region as part of BMEC region development, upgradation of Hubballi airport to an International Airport is more crucial. Further, considering a plan period of 25 years, this proposal is an essential infrastructure for the region. Already State government has allotted land for expansion of the airport and additional land acquisition is also being discussed. Considering the need to expand it as an international airport, the planned acquisition process needs to be implemented.

Development of Air Cargo Facility at Belagavi Airport

Belagavi is also being proposed as an Industrial Node of BMEC region and is also identified as a potential hub for aerospace industry. Already there are few aerospace manufactures in the region

and the industry is expected to grow further. In order to facilitate the proposed industrial development, emerging aerospace & other allied industries and also other sectors of the district, there is need to explain the existing airport and also to develop an Air Cargo terminal.

Shivamogga Airport

Greenfield airport at Shivamogga is currently at preliminary stage of construction. Shivamogga is the closest airport for the potential node/economic centre Chitradurga which is connected by NH-13. NH-13 is currently a 2 lane facility and will exceed its design capacity in the near future. NH-13 needs to be widened to minimise the delays and travel time between Shivamogga and Chitradurga. Shivamogga airport is approximately 160 km from Honnavar port, connected by NH-206 which is 2 lane facilities. Traffic forecast analysis of NH-206 states that the existing 2 lane carriage is inadequate and requires improvement proposals to reduce travel time and delays on NH-206.

Karwar Airport

Greenfield airport at Karwar is proposed as a defence airport and will be utilised as civil enclave also by constructing terminal building by AAI. Karwar airport is located along NH-17 which is accessible to the all the ports of Karnataka. However, the perspective plan recommends a dedicated airport which would facilitate the region and the ports in long term perspective. NH-17 is currently 2 lanes at some of the sections and widening is already proposed by NHAI.

Mopa / Sindhudurg Airports

Airports proposed at Mopa and Sindhudurg (Chippi) are located along NH-17 which are accessible to the ports in Goa, Karnataka and Maharashtra states. Mopa is located 100 km from Belagavi which proposed as potential node under BMEC region. Mopa and Belagavi are connected via State Highways (SH-134 & SH-121) which are of intermediate lane facility and are inadequate to handle the future traffic. Improvement and widening of the state highway SH-134 and SH-121 is necessary.

Vijayapura Airport

Greenfield airport at Vijayapura is currently at preliminary stage of construction. The proposed BMEC expressway corridor traverses through Athani town which is located at a distance of 75 km from the Vijayapura town. State highway SH-12 which is currently a two lane paved shoulder facility connects the two towns Vijayapura and Athani. The traffic on SH-12 will exceeds its design capacity in the near future based on the forecast and widening of this stretch is essential for free flow traffic movement between the proposed BMEC expressway and Vijayapura aiport.

Sangli & Solapur Airports

The proposed Sangli airport is located along NH-204/SH-3 at a distance of about 50 km from Kolhapur (NH-4) and 35 km from the proposed BMEC expressway. Also, Solapur airport is about 150 km from proposed BMEC expressway connected via NH-204/SH-3. The corridor NH-204/SH-3 is currently a 2 lane facility and the traffic on this is corridor is likely to increase due to the proposed potential nodes of BMEC. Based on the traffic forecast widening of this stretch is essential for free flow traffic movement between the proposed BMEC expressway, NH-4 and Sangli & Solapur aiports

Other Airport Development Project:

Apart from the above-identified proposals for BMEC, Government of India and the respective state government have also identified development and enhancement of airport infrastructure of the

state which would also directly or in-directly influence the development of the region. The following table provides list of airport projects as identified for development.

Table: Upcoming Airport Projects and Expansion works on Existing Airports

Airport	City	State	Insight
Navi Mumbai	Mumbai	Maharashtra	Identified in 12th Planning report; to be developed as PPP;
Amravati	Belora	Maharashtra	On going
Shirdi	Ahmednagar	Maharashtra	Commenced on 2010
Sindhudurg	Chipi-Parule	Maharashtra	In-principal approved in 2009
Rajgurunagar	Pune	Maharashtra	International airport
Kawalapur	Sangli	Maharashtra	New airstrip
Expansion of BIAL	Bengaluru	Karnataka	Construction of parallel runway and Terminal 2; Capacity reaches 35 Million
Hubballi Airport upgradation to international	Hubballi	Karnataka	Land acquisition almost completed
Development of minor Airports	Shivamogga, Kalaburagi, Vijayapura, Hassan	Karnataka	Approved by MOCA; Shivamogga&Kalaburagi – Land acquired; Kalaburagi to be operated in 2014
Development of Bidar and Karwar airports	Bidar, Karwar	Karnataka	For civil operations
Mopa	Goa	Goa	Tender process going on
Developments of MH Airports	Akola, Amravati, Jalgaon, Kolhapur, Solapur	Maharashtra	Proposed in Budget 2014-15
Developments of KN Airports	Belagavi, Hubballi	Karnataka	Proposed in Budget 2014-15
24 X 7 custom clearance facility	13 airports	-	Proposed in Budget 2014-15

Airport Connectivity:

The airports are well connected with the roads and railway networks running in the states. However, some roads are in poor condition and are inadequate to carry high levels of traffic. Therefore to cater future traffic efficiently, the following roads are proposed for upgradation. Based on the capacity analysis the list of state highway and national highways for which up-gradation is recommended along with cost estimate is presented in tables below. However these are preliminary estimates and are subject to change and the cost per km refers to construction cost and does not include land acquisition cost.

Table: Phase Wise Improvement of Roads Recommended for Up-gradation in Maharashtra

	Road	Sections	Connectivity	Existing lanes	Proposed Lanes	Length	Cost per km (in Crores)	Total Cost (in Crores)
2017 (Phase 1)								
Total Cost of Phase 1								-
2022 (Phase 2)								
1	NH-204/ SH-3	Kolhapur-Sangli-Kamalapur	NH-4-Sangli-Solapur (Crosses BMEC Expressway near Sangli)- Connectivity to Sangli & Solapur Airports	2L	4L	130	9	1170
		Kamalapur-Sangola		4L	-	8	-	-
		Sangola - Ghatne (NH-9)		2L	4L	70	9	630
2	SH-134	Sankeshwar (NH-4) - Tita	NH-17 to Redi Port- Connectivity to Mopa & Chipi Airports	IL	2L+PS	63	5.5	347
	SH-180/ SH-121	Tita - Sawantwadi		IL	2L+PS	37	5.5	204
	SH-123	Sawantwadi - Redi Port		IL	2L+PS	30	5.5	165
Total Cost of Phase 2								**2,516**
2027(Phase 3)								
1	SH-134	Sankeshwar (NH-4) - Tita	NH-17 to Redi Port- Connectivity to Mopa & Chipi Airports		2L+PS	4L	63	6.5	410
	SH-180/ SH-121	Tita - Sawantwadi			2L+PS	4L	37	6.5	241
	SH-123	Sawantwadi - Redi Port			2L+PS	4L	30	6.5	195
Total Cost of Phase 3									**846**
Total Cost of Road Improvements in Maharashtra State									**3,362**

Note: Cost does not include land acquisition cost

Table: Phase Wise Improvement of Roads Recommended for Up-gradation in Karnataka

S. no	Road	Sections	Connectivity	Existing lanes	Proposed Lanes	Length	Cost per km (in Crores)	Total Cost (in Crores)
2022(Phase 2)								
1	SH-12	Vijayapura - Athani	Vijayapura - BMEC Expressway- Connectivity to	2L+PS	4L	74	6.5	481

			Vijayapura Airport					
Total Cost of Phase 2								**481**
2027(Phase 3)								
1	SH-2	Haveri - SH-69 (Yekkambi)	NH-4 (Haveri) - Sirsi - Kumta/Belekeri Ports-Connectivity to Karwar Airport	2L+PS	4L	54	6.5	351
Total Cost of Phase 3								**351**
Total Cost of Road Improvements in Karnataka State								**832**

Note: Cost does not include land acquisition cost

13.6 POWER PERSPECTIVE

Power Infrastructure is one of the major component, which facilitates industrialization and this is a very vital component for the planned economic development of BMEC. The following part of the chapter would analyze the existing power demand, estimates the future demand as per projected industrialization of the BMEC & the strategies to meet the estimated demand.

Existing Power Scenario Highlights.

As the existing power scenario of the BMEC States covering its total installed capacity, various modes of power generation, location of power plants across the State etc. were already covered in the State Profile this section will highlight the power demand, supply and deficit of power in the BMEC States .

The Peak demand and Peak met of the BMEC States, are around 21,069 MW & 16,417 MW respectively for Maharashtra and 10545 MW & 8549MW respectively for Karnataka. Similarly the actual energy demand & availability is around 141382 MU & 117722 MU respectively in Maharashtra and 60830 MW & 54023 MU respectively in Karnataka. As observed,

- **In Maharashtra, the peak demand deficit has increased from 17% in 2005-06 to 22% in 2011-12.**
- **In Karnataka, the peak demand deficit in the state has increased from 5% in 2005-06 to 19% in 2011-12.** Between 2005-06 and 2011-12, **peak electricity demand grew at a CAGR of 9%,** while peak demand met at CAGR of 6%. The following graph illustrates the peak demand, peak supply & deficit of both the BMEC States.

Maharashtra

Figure 13-2: Peak Demand/ Peak Met in Maharashtra

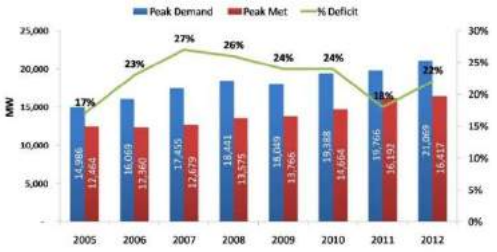
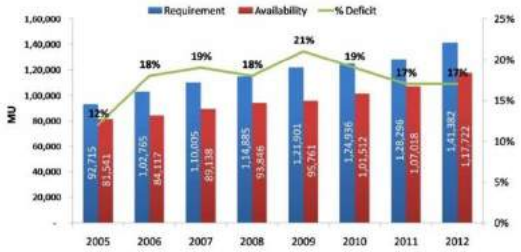


Figure 13-3: Actual Power Supply Position in Maharashtra



Karnataka

Figure 13-4: Peak Demand/ Peak Met in Karnataka

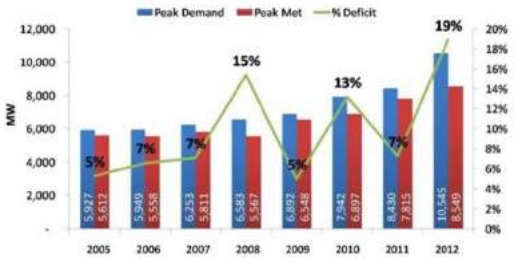
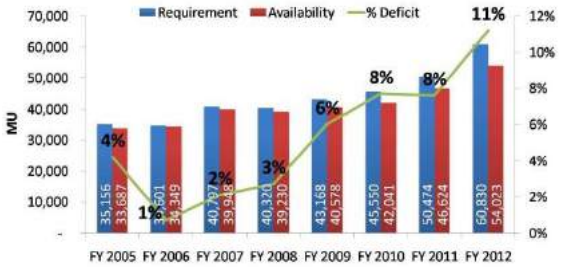


Figure 13-5: Actual Power Supply Position in Karnataka



Source: CEA and other secondary sources

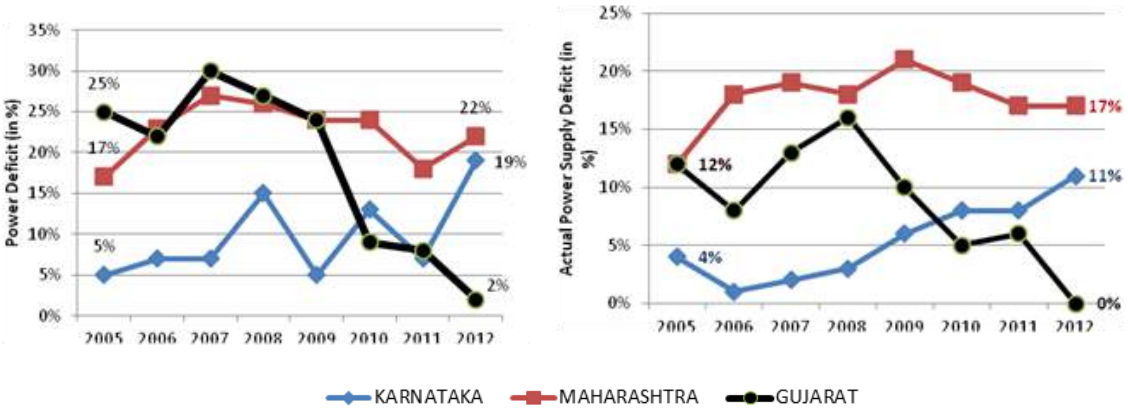
13.6.1 Comparative Analysis of BMEC States with Other States

Power Demand and Supply

Gujarat is one of the states which have become successful in securing its **overall energy requirements with installed power generation capacity of 23,927 MW (as of Aug 2012).** This is one prime driving factor which is facilitating the State to emerge as the leading Industrial destination of the country. **The peak demand-peak deficit in the state has decreased from 25% in 2005 to 2% and actual supply deficit is almost dropped to nil from 12%.**

Figure: Power Deficit Comparison with Gujarat (2005-2012)

Figure: Actual Power Supply Deficit Comparison with Gujarat (2005-12)



Source: CEA and other secondary sources, Analysis- Egis

Installed Capacity & Rate of Increase of Additional Capacity

The total installed capacity in the BMEC States of Karnataka and Maharashtra is as shown below.

Table: Total Installed Capacity of BMEC States in MW (2011-2014)

Year	Karnataka	Maharashtra	Total
2011	12366.73	23881.61	36248.34
2012	13490.63	26838.48	40329.11
2013	13818.11	31934.15	45752.26
2014	14269.77	35167.37	49437.14

Source: CEA

By 2022, an additional capacity of 14265 MW in Karnataka and 6300 MW in Maharashtra making a total of 20565 MW is already proposed. This would bring the total installed capacity in 2022 to 70,002 MW.

Increasing the power generation capacity each year along with the growing demand, increasing the share of Renewable energy, etc. has supported Gujarat in improving the power scenario of the state in the recent years. The table below gives the CAGR (2011-14) of the capacity addition in the three states. Though the installed capacity of Maharashtra is the highest as can be seen from figures above, the rate at which the capacity addition is carried out in Gujarat is much higher (19.25%) enabling the state to be in a much better position in the power sector in the recent future.

Table: CAGR (2011-14) of Installed Capacity addition in BMEC States and Gujarat

Power Plant Type	Karnataka	Maharashtra	Gujarat
Thermal	4.25	15.01	19.65
RES	12.00	22.20	26.34
Total Installed Capacity	4.89	13.77	19.25

Source: CEA,Analysis- Egis

Industrial Share of Power Consumption

The table below shows the industrial share of power consumption in the BMEC States and other industrially developing states in 2011. The highest share as can be seen is for Gujarat with 59% and Karnataka has the least wit 33% share. Similarly, the share of power consumed by agriculture sector is much higher in Karnataka with 31%.

Table: Category Wise share of Power Consumption 2011

State	Domestic	Commercial	Industrial	Agriculture	Others
Karnataka	19%	11%	**33%**	31%	6%
Gujarat	13%	6%	**59%**	19%	3%
Maharashtra	21%	13%	**43%**	18%	6%
Andhra	20%	7%	**40%**	26%	7%
Tamil Nadu	24%	9%	**43%**	18%	6%

Source: Secondary Sources

13.6.2 Identification of Major Issues & Bottlenecks

From the above analysis and secondary & primary research, the major bottlenecks for promotion of Industrial development due to power sector can be categorized as:

1. **Power Demand and Supply Gap**
2. **Insufficient Rate of Capacity Addition**
3. **Sectoral Share of Power Supply**

- In Karnataka, the peak electricity demand grew at a CAGR (2005-12) of **9% whereas the addition of total installed capacity is growing at a CAGR (2011-14) of only 4.89%.** Maharashtra is slightly at a better rate with 13.77%.
- **In case of Karnataka, the share of power supply for Agriculture is as high as 31%. As agriculture demand is not constant & is seasonal**, during the rainy season, the demand for electricity in the sector is considerably reduced, as the water demand is met naturally. **The power for generating irrigation pumps is not required due to which some of the power plants are shut down during this season.** This reduces the overall efficiency of the power plant.
- **Decrease in the Plant Load Factor (PLF)** of the coal based power plants; hydro power plants in Karnataka & Maharashtra are also a factor contributing to the power deficit in the state.

13.6.3 Forecasts of Power Demand and Gap

The peak power demand forecasts for the two BMEC states as per existing rate of demand are as shown below.

Table: Forecast of Peak Power Demand (in MW) in BMEC States

Years	Karnataka (9% CAGR 08-12) (in MW)	Maharashtra (4.98% CAGR (05-12) (in MW)	Total for BMEC States (in MW)
2017	14298	26851	**41149**
2022	21999	34237	**56236**
2027	33848	43655	**77502**
2032	52079	55663	**107741**
2037	80129	70973	**151103**
2041	**113109**	**86203**	**199312**

Source: Egis

With the development of the BMEC region (BIS Scenario), the additional power demand expected for the industrial and domestic sector is shown in the table below. The additional demand for industrial sector has been calculated based on the industrial land area that is projected to be added due to BIS scenario in BMEC and the domestic load was calculated based on the projected population for the BMEC region. **As projected, the total additional demand for the BMEC region in 2041 is 30,575 MW.**

The following table gives the state wise additional power demand in domestic and industrial sectors.

Table: State Wise Additional Power Requirement for Industrial and Domestic Sector in the BMEC Region (BIS Scenario)

Year	Additional Domestic Load (in MW) assuming 0.4 diversity factor		Additional Industrial Load (in MW)		Total Additional Demand (in MW) *	
	Karnataka	Maharashtra	Karnataka	Maharashtra	Karnataka	Maharashtra
2017	787	395	20	12	1010	509
2022	1501	827	269	206	2213	1291
2027	2428	1382	811	628	4050	2513
2032	3641	2273	1726	1435	6708	4635
2037	5272	3756	3280	2884	10691	8300
2041	**7240**	**5896**	**5779**	**5545**	**16274**	**14301**

**Assuming that Industrial and Domestic Demand will be 60% and 20% respectively of the total additional demand.*

Source: Egis

Actual Power Supply Deficit

The actual power supply requirement in MU projected as per the CAGR (2005-12) for Karnataka and Maharashtra is projected, to find the actual power supply requirement for the target years. **The CAGR (2005-12) of 8.15 % for Karnataka and 6.12% for Maharashtra is considered for the projection assuming that the power supply requirement will follow the current trend and it is estimated that both the States together will require 1401365 MU by 2041. The following table will provide the State wise breakup of the estimated power requirement till 2041.**

Table: Actual Power Supply Requirement in MU, BMEC States

Year	Power Supply Requirement (in MU)		
	Karnataka	Maharashtra	Total
2017	90002	191083	281084
2022	133163	258255	391418
2027	197022	349040	546062
2032	291507	471740	763246
2037	431301	637572	1068874
2041	**590048**	**811318**	**1401365**

Source: Egis

The planned additional capacity as proposals for Karnataka and Maharashtra by 2022 is 14265 MW and 6300 MW respectively. As data on capacity addition beyond 2022 is not available, the installed capacity at 2022 is considered till the target year of 2041. **Based on the projections & estimation of power supply, there will be a residual demand of 1108621 MU by 2041. i.e. The installed & proposed capacity addition by the States can fulfil only 87% & 75% of the power requirement by 2017& 2022 respectively and this residual demand will grow up to 79% by 2041, with 482563 MU**

as Karnataka's residual demand & 626058 as Maharashtra's residual demand. This emphasis the need for major capacity additions to be planned for both the States

Table:Power Supply Available (in MU) and Residual Demand, BMEC States Total

Year	Total			
	Installed Capacity MW	Power Supply Available (MU)	Residual Demand (MU)	Residual Demand %
2017	57481	243429	37655	13
2022	70002	292744	98673	25
2027	70002	292744	253318	46
2032	70002	292744	470502	62
2037	70002	292744	776129	73
2041	**70002**	**292744**	**1108621**	**79**

Source: Egis

SUMMARY	
TOTAL POWER DEMAND IN 2041 (BAU) (Karnataka and Maharashtra)	**1,99,312 MW**
ADDITIONAL POWER DEMAND IN 2041 (BIS)	**30,575 MW**

Source: Egis

13.6.4 Proposed Power Perspective

Although installation of additional power plants and enhancement of existing power plants would fill the gap between demand and supply. Certain conservation strategies, technological improvement in manufacturing sector, cross sectoral enhancements in power consumption, enhancement in power generation, transmission & distribution systems & infrastructure etc. would facilitate saving power, which can fulfil the power demand. In order to meet the gap in power demand and supply, some of the possible measures that can be taken are mentioned below.

1. **Sector Wise Conservation Potential to be utilised**
2. **Increasing Plant Load Factor(PLF) of Thermal Power Plants**
3. **Reducing T and D Losses**
4. **Increased Use of Renewable Energy Sources**

Sector Wise Conservation Potential

Karnataka

Industrial Sector: The energy sales in this sector were 9221 MU forming 22% of the total energy sales. The electrical energy saving potential in **industrial sector through technological upgradation varies from 7-10% which is around 645 MU annually.**

Agriculture Sector: In 2012, the energy sales in the agriculture sector 15613 MU which formed 37% of the total energy sale. The major energy utilization in the sector is in the operating irrigation pumps, the efficiency of which varies between 25-30%. Using improved pump sets with efficiencies ranging between 50-52%, the energy saving potential of the sector can be around 30-40%. **This indicates a 4683 MU can be saved annually in the sector.**

Commercial Sector: The total energy sales in the commercial sector in 2012 were 5394 MU and forms 13% of the total energy sales. Various studies reveal that energy savings potential in commercial buildings varies from 20-30% and this can bring down the power consumption of Commercial Sector.

Domestic Sector: The total energy sale in the domestic sector in 2012 is around 8158 MU which forms 19% of the total energy sales. On the whole, the energy savings potential in domestic sector through use of efficient electrical equipments is estimated **20-25% which comes to around 1631 MU annually**.

With the energy saving potential considered for industrial, domestic and agriculture, around 14% (6959 MU) of the energy can be saved in the state.

Maharashtra

Industrial Sector: Average saving potential through technological upgradation varies from 7**-10% in the sector, the MU that can be saved comes to around 2221.**

Agriculture Sector: With an average saving potential of 30-40% in the sector, the total MU that can be saved comes to 4293 MU.

Commercial Sector: Various studies reveal that energy savings potential in commercial buildings varies from 20-30%.

Domestic Sector: With an average saving potential of 20-25%, the total MU that can be saved in the sector comes to around 3735 MU.

With the energy saving potential considered for industrial, domestic and agriculture alone, around 12.5% (10249 MU) of the energy can be saved in the state.

Increasing the Plant Load Factors (PLFs) of Thermal Power Plants

Decreased PLFs is a major reason for the increased power deficit in the states. The PLFs of major thermal power plants like RTPS and BTPS has reduced over the years from more than 80% to around 60%. **Shift in the use from washed coal to raw coal in the power plants, Forced outages due to failure of equipment,** Lack of spares for old equipment. Etc. are identified as key issues for decrease in PLF.

If the PLFs of the power plants are increased gradually, a large portion of the residual demand of the states can be met. Projections indicate that the total residual demand of 79% can be brought down to 67% by 2014 by improving the PLF of the power plants of both the States. The following table illustrates the same. Detailed State wise break up was given the main part of the report.

Table: Residual Demand with increased PLF, BMEC States

Year	Installed Capacity MW	Power Supply Available (MU)	Residual Demand (in MU)	Residual Demand % (With increased PLF)	Residual Demand %(with current PLF)
2017	57481	285403	-4319	-2	13
2022	70002	342935	48483	12	25
2027	70002	342935	203128	37	46
2032	70002	342935	420311	55	62
2037	70002	462918	605956	57	73
2041	70002	462918	938448	67	79

Source: Egis

Reduction in T&D Losses

The T & D losses for Karnataka in the year 2012 are 19.57% and that for Maharashtra is 20.68%. States like, Tamil Nadu and Andhra Pradesh have achieved lower losses of 13.47 % and Andhra 16.59% respectively. Targeting a one point decrease in T & D losses every year, the total MU that can be saved leads to a reduction of around 19% of the total residual demand estimated for 2041. The following table provides the State wise break of possible power saving by reducing T&D losses.

Table: MU Saved and Decreased Residual Demand with reduced T & D Losses

Year	MU Saved by Decreased T&D Losses			Residual Demand			Residual Demand %		
	Karnataka	Maharashtra	Total	Karnataka	Maharashtra	Total	Karnataka	Maharashtra	Total
2017	693	5732	6425	17424	13806	31230	19	7	11
2022	7683	20660	28344	17995	52335	70329	14	20	18
2027	21219	45375	66595	68318	118405	186724	35	34	34
2032	45971	84913	130884	138051	201567	339618	47	43	44
2037	74788	131850	206638	249029	320463	569492	58	50	53
2041	102314	167781	270095	380249	458278	838526	64	56	60

Source: Egis

Increased Use of Renewable Energy

Both the States of BMEC has a potential of more than 26000 MW of Renewable Energy Sources, through wind & Small Hydro Projects. Further, majority of both the State area is considered suitable for tapping Solar energy and this will add to the overall RES potential of the BMEC States. The renewable energy potential in the two BMEC states and percentage of the potential utilized are shown in table below. This indicates that there is immense opportunity to harness the renewable energy potential in both the states which can be utilized for reducing the overall power deficit.

Table: Renewable Energy Potential and Utilization, BMEC States

State	Type	Potential (in MW)	Commissioned and Under Implementation (in MW)	Remaining Potential (in MW)	% of Potential Utilized
Karnataka	**Wind Power**	13236	7000	6236	53
	SHP	7000	2918.65	4081	42
	Solar	*	232	*	
Maharashtra	**Wind Power**	5439	3431	2008	63
	SHP	732.63	263.825	469	36
	Solar	*	275.25	*	

**Any place with solar radiation (DNI) above 5.00 kWh/sq m/day is considered suitable for solar power plants. The entire states of Karnataka and Maharashtra are suitable for developing solar power plants if other conditions of site suitability are satisfied. Source: MEDA, KREDL*

The following table provides a comprehensive summary of potential energy which can be saved and utilised to meet the demand through the above-mentioned list of conservation measures and strategies

Energy Saving Strategy	Energy Saved	
	Maharashtra	Karnataka
Sector Wise Conservation Potential to be utilised	**12.5% (10249 MU)**	**14% (6959 MU)**
Increasing the Plant Load Factors (PLFs) of Thermal Power Plants	**Around 5% reduction in Residual Demand**	**Around 24% reduction in Residual Demand**
Reduction in T and D Losses	**18% reduction in Residual Demand**	**18% reduction in Residual Demand**
Increased Use of RES	**Around 3667 MW (within BMEC region)**	**Around 5614 MW (within BMEC Region)**

Source: Egis

Additional Capacity Requirement & Other Strategies meet to demand

BMEC Region

The estimated additional power demand in the BMEC Region is around 48964 MW. Additional power plants, apart from the already proposed ones need to be set up in the BMEC Region in order to meet this demand. Keeping the vision of developing the BMEC Region as a sustainable Green Corridor, in purview, it is proposed to utilise the untapped potential of the renewable energy sources of both the states to meet a considerable portion of the additional energy demands. Both the BMEC states have immense potential in terms of wind, small hydro power (SHP) and solar energy, only a portion of which is currently utilised.

The MNRE has already proposed to increase the share of RES in country by 15% by 2020 in the total energy mix. Keeping this in purview and the possibility of tapping the vast RES potential of the

region, it is targeted that at least 20% of the additional demand of the BMEC region needs to be met by RES power plants. The following tables gives the MW that can be tapped from wind, SHP and solar energy and the number of power plants required to meet these MW for Karnataka and Maharashtra.

The total MW that can be trapped from renewable energy sources and the number of power plants state wise is indicated below.

Table: Targeted Power demand to be met from wind, solar and SHP and number of power plants in Karnataka and Maharashtra

Year	WIND POWER, (MW) (number of plants considering average 120 MW per plant)		SHP (number of plants considering 25 MW per plant)		SOLAR	
	Karnataka	Maharashtra	Karnataka	Maharashtra	Karnataka	Maharashtra
2017	125(1)	40(0)	41 (2)	5 (0)	81	41
2022	374(3)	120(1)	41(2)	5(0)	221	129
2027	499(4)	161(1)	82(3)	9(0)	607	302
2032	935(8)	301(3)	122(5)	14(1)	1006	695
2037	1247(10)	402(3)	122(5)	14(1)	2138	1494
2041	1871(16)	502(4)	163(7)	19(1)	3580	3146

Source: Egis

**Values in parenthesis indicates the number of power plants*

Table: Percentage share of RES Power to meet additional demand in Karnataka and Maharashtra

Year	KARNATAKA			MAHARASHTRA		
	Additional Power Demand Karnataka (MW)	MW from RES (Solar+Wind +SHP)	% share of RES of total additional demand	Additional Power Demand (MW)	MW from RES (Solar+Wind +SHP)	% share of RES of total additional demand
2017	1010	246	**24**	509	86	**17**
2022	2213	636	**29**	1291	254	**20**
2027	4050	1188	**29**	2513	472	**19**
2032	6708	2064	**31**	4635	1011	**22**
2037	10691	3508	**33**	8300	1910	**23**
2041	16274	5614	**34**	14301	3667	**26**

Source: Egis

Up to 30% of the additional demand of 30,575 MW for power can be met through renewable energy sources in the BMEC region. The approximate cost of the RES power plants is as indicated below.

Table: Cost of RES Power Plants, BMEC Region

Year	RES POWER PLANTS COST (in Rs. Crores)		RES POWER PLANTS COST BMEC Region (in Rs. Crores)
	Karnataka	Maharashtra	
2017	1657	584	2240

2022	4335	1744	6079
2027	8099	3237	11336
2032	14085	6945	21030
2037	24031	13144	37175
2041	38498	25261	63759

Source: Egis

However it needs to be noted that the 30% share of energy from renewable energy sources is in terms of installed capacity and the actual demand that can be met will be much lesser than this when the plant load factors of RES power plants are considered. By definition, the plant load factor (PLF) is the ratio of the actual output of a power plant over a period of time and its output if it had operated a full capacity of that time period. The PLFs of RES power plants are comparatively much lower than that of coal based thermal power plants. The RES plant's fuel (wind, sunlight or water) may not be available for the plant to function at full capacity at all times. In case of wind farms, the natural variability of the winds and in case of solar power plants, the seasonal changes, cloud cover etc lead to lower plant load factors.

Considering an average PLFs of 25% for Wind Power Plants, 44% for Small Hydro Power Plants and 25% for Solar Power Plants, the MW that can be met by RES is indicated in the tables below.

Year	MW that can be met by RES Considering the PLFs		
	Karnataka	Maharashtra	BMEC
2017	69	22	92
2022	167	64	231
2027	312	120	432
2032	539	255	795
2037	900	480	1380
2041	1435	920	2355

The remaining estimated power demand to be met through other energy sources is around **28220 MW** by 2041. This power demand can be met through thermal and gas based power plants. Since gas based power plants have environmental advantages as compared to other form of solid fuel based thermal based ones, and also due to the fact that BMEC region has Dabhol- Bengaluru Gas pipeline passing through it, it has been attempted to meet a major portion of the remaining power demand through gas based power plants.

The year wise remaining demand to be met and the number of coal based & gas based thermal power plants required to meet the same are tabulated below.

Table: Thermal Power Plants: Targeted Energy Demand to be met from Thermal Power Plants and Number of Power Plants, Karnataka

KARNATAKA						
Year	**Total Additional Demand (in MW)**	**MW met from RES**	**Remaining MW to be met from other sources**	**Number of UMPP (4000MW)**	**Number of STPS (1000 MW)**	**Total MW from Thermal Power Plants**
2017	1010	**69**	**940**	0	1	1000
2022	2213	**167**	**2046**	0	1	1000
2027	4050	**312**	**3737**	0.5	1	3000

2032	6708	**539**	**6169**	1	2	6000
2037	10691	**900**	**9790**	1.5	3	9000
2041	16274	**1435**	**14839**	2.5	3	13000

Source: Egis

Table: Gas based Power Plants: Targeted Energy Demand to be met from Gas Based Power Plants and Number of Power Plants, Karnataka

KARNATAKA					
Year	**Remaining MW to be met**	**Number of Gas based power plants (@700 MW capacity per plant)**	**Total MW from Gas Based Power Plant**	**Cost of Thermal Power Plants @ Rs. 6 crores per MW**	**Cost of Gas Based Power Plants @ Rs. 3.5 crores per MW**
2017	-60	0	0	6500	0
2022	1046	2	1400	6500	4900
2027	737	2	1400	19500	4900
2032	169	2	1400	39000	4900
2037	790	2	1400	58500	4900
2041	1839	3	2100	84500	7350

Source: Egis

Table: Thermal Power Plants: Targeted Energy Demand to be met from Thermal Power Plants and Number of Power Plants, Maharashtra

MAHARASHTRA						
Year	**Total Additional Demand**	**MW met from RES**	**Remaining MW to be met from other sources**	**UMPP (4000MW)**	**STPS (1000 MW)**	**Total MW from Thermal Power Plants**
2017	509	22	486	0	0.5	500
2022	1291	64	1226	0	0.5	500
2027	2513	120	2393	0	1.5	1500
2032	4635	255	4380	0.5	1.5	3500
2037	8300	480	7820	1	2.5	6500
2041	14301	920	13381	2	3.5	11500

Source: Egis

Table: Gas based Power Plants: Targeted Energy Demand to be met from Gas Based Power Plants and Number of Power Plants, Maharashtra

MAHARASHTRA					
Year	**Remaining MW to be met**	**Number of Gas based power plants (@700 MW capacity per plant)**	**Total MW from Gas Based Power Plant**	**Cost of Thermal Power Plants @ Rs. 6 crores per MW**	**Cost of Gas Based Power Plants @ Rs. 3.5 crores per MW**
2017	-14	1	700	3250	2450
2022	726	2	1400	3250	4900

2027	893	2	1400	9750	4900
2032	880	2	1400	22750	4900
2037	1320	2	1400	42250	4900
2041	1881	3	2100	74750	7350

Source: Egis

The approximate cost for setting up the proposed power plants state wise and as a whole region is given in the following tables.

Table: Cost of Power Plants, Karnataka

KARNATAKA				
Year	**Total Cost of Renewable Energy Power Plants (in Crore Rupees)**	**Cost of Thermal Power Plants (in Crore Rupees)**	**Cost of gas Based Power Plants (in Crore Rupees)**	**Total Cost of Power Plants**
2017	1657	6500	0	8157
2022	4335	6500	4900	15735
2027	8099	19500	4900	32499
2032	14085	39000	4900	57985
2037	24031	58500	4900	87431
2041	38498	84500	7350	130348

Source: Egis

Table: Cost of Power Plants, Maharashtra

MAHARASHTRA				
Year	**Total Cost of Renewale Energy Power Plants (in Crore Rupees)**	**Cost of Thermal Power Plants (in Crore Rupees)**	**Cost of gas Based Power Plants (in Crore Rupees)**	**Total Cost of Power Plants**
2017	584	3250	2450	6284
2022	1744	3250	4900	9894
2027	3237	9750	4900	17887
2032	6945	22750	4900	34595
2037	13144	42250	4900	60294
2041	25261	74750	7350	107361

Source: Egis

As per the preliminary estimates, summary of the number of power plants required in the BMEC Region and the power supplied is given below.

SUMMARY	
Number of UMPP Required (of average 4000 MW capacity) in BMEC by 2041	**4.5 units** **Demand Supplied: 18,000 MW**
Number of STPP Required (of average 1000 MW capacity) in BMEC by	**6.5 units**

2041	**Demand Supplied: 6500 MW**
Number of Gas Based Power plants Required (of average 700 MW capacity) in BMEC by 2041	**6 units** **Demand Supplied: 4200 MW**
Number of RES Power Plants in BMEC by 2041	**20 Wind Power Projects with average 120 MW Capacity** **Demand Supplied: 2373 MW** **8 SHP Projects with 25 MW Capacity** **Demand Supplied: 200 MW** **Solar Power Plants** **Demand Supplied: 6727 MW** **Total Demand Supplied by RES: 9281 MW**

13.7 WATER PERSPECTIVE

13.7.1 Water Resources Over view

National Scenario

With reference to UNICEF's situation and prospects analysis of India's water scenario mapping, except Northern Eastern States, Godavari Basin & small parts of south India's east flowing river basins, major portion of the country fall under severe shortage of water against the supply quantity at 2030. Since about 80% of the delineated BMEC region falls within Krishna basin which falls within the area which is projected to have Severe Gap between supply & demand, it is clear that efficient water resource management is vital for the development of the region.

Further, as per the estimates of the Ministry of Water Resources (MoWR) the utilizable water resources of the country have been assessed at 1,123 billion cubic meters, of which 690 billion cubic meters is from surface water source and 433 billion cubic meters from ground water source. **Harnessing this 690 billion cubic meter of utilizable surface water is possible only if matching storages are built Trans-basin transfer of water, if taken up to the full extent as proposed under the National Perspective Plan, would further increase the utilizable quantity by approximately 220 billion cubic meters (Planning Commission, 2007).**

Availability of water

Surface water availability

Karnataka:

Approximately 40% of the surface water is contributed by east flowing rivers while the remaining 60% are from west flowing rivers. The average annual yield of the rivers of the Karnataka has been roughly estimated as 98,406 million cubic meters (3,475 Tmc).

Table: Total utilisable surface water, Karnataka

Basin	Ultimate utilization in TMC
Total for Krishna Basin	1156 .00
Cauvery	408.62
Godavari	22.37
Other basins	103.31
Total for the state	**1690.30**

Source: Water resource department- Karnataka

Maharashtra:

The average permitted water availability in the state of Maharashtra is 125936 m.cum. Out of the five major river basin systems, 55% of the dependable yield is available in the four river basins - Krishna, Godavari, Tapi and Narmada. Even though West flowing rivers' permitted use of water is 69210 mm3, only approximately 10% of the total available yield is utilized due to geological constraints.

Table: Basin wise break up of total yield and utilizable water, Maharashtra

Name of basin	75% dependable yield (in TMC)	Permitted use of Water (in TMC)

1	West flowing rivers in Konkan	2067.55	2441.94
2	Tapi	246.17	191.06
3	Narmada	11.11	10.87
4	Krishna	1001.02	593.39
5	Godavari	1316.06	1206.15
	Total Maharashtra	**4641.92**	**4443.41**

Source: Water Resource department, Maharashtra

Ground water availability:

The annual ground water draft of Karnataka is 10.71 billion cubic meter. Karnataka experienced a decline in net annual groundwater availability by 3.2% between 2004 and 2009. The decline is attributed to extraction beyond amounts replenished. Groundwater sources provide for 45% of irrigation in the state. As per Central statistics, the annual ground water draft of Maharashtra is 15.3 billion cubic meter. Currently ground water resources are utilized in large portions for domestic and industrial purposes within the BMEC districts of the state.

Current Demand and pressure of the BMEC states:

Current demand and sector wise split

Karnataka:

Agriculture sector was the major consumer of water with a share of about 84%, followed by domestic drinking water supply at 4.4%, Power & Industries consume around 4% & 3.6% respectively and balance 4% was under other consumptions. This is as per consumption data of 2000 and the same projected as per planning commission indicates the share to be 79.38%,5%, 4.75%,3.8% & 7% for Agriculture, Industries, Domestic, Power & other in the 2013.

Estimated total water usage of Karnataka in 2013 is around 1551.75 TMC out of which about 78.65 TMC is for industrial usage. The current demand of 2013 is compared with the current utilizable surface water of 1690.3 TMC, even though there is a surplus situation there is an alarming decrease in the difference between in the absolute supply and demand which creates pressure on the state. Further, the demand is estimated only based on data available on Surface water utilisation and does not consider water consumed from Ground water and considering the same, the demand would be actually more.

Maharashtra:

As can be seen in the table, agriculture sector is the major consumer of water with a share of about 81.25%, followed by domestic dirking water supply at 6.5%, industries at 3.2% and other at 5.5%.The estimated water demand at a normal growth scenario is around 2243.62 TMC which is much below the current utilisable water volume available for the State and the share of agriculture consumption alone is around 1903 TMC, which also exceeds the available utilisable volume of the State.

13.7.2 Water demand forecasting

Over all Water Demand of the State

Based on the estimated CAGR of sector based water demands and total demand of water by estimated by Planning commission for the period of 2025 for Karnataka and 2030 for Maharashtra, the demand of water up till the horizon period of 2041 is estimated to be around 7726.59 TMC.

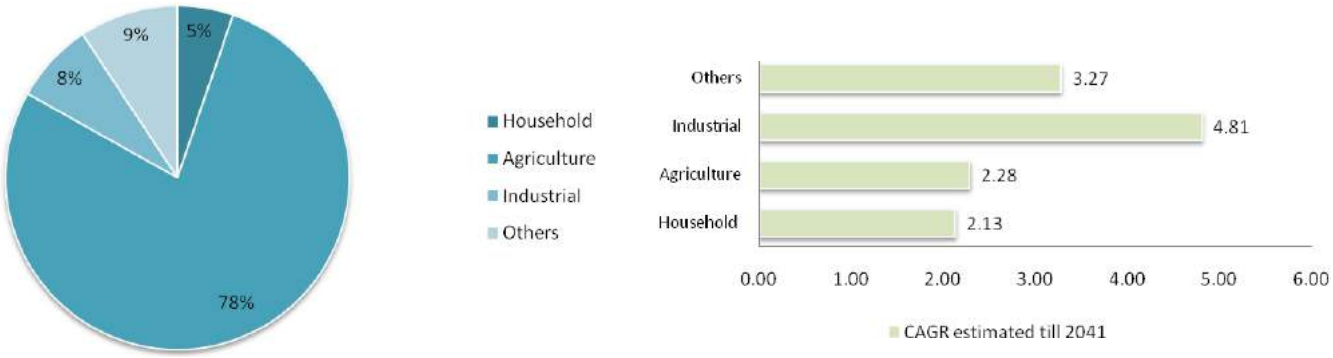
Table: Water demand projected for Karnataka & Maharashtra, 2041

Year	2013	2041
	(in TMC)	(in TMC)
Water demand - Karnataka	1551.75	2484.14
Water demand- Maharashtra	2243.62	5242.45
Total of BMEC States	3795.37	7726.59

Source: Planning commission state development report, Steering Committee on Water Resources – Planning Commission (2007-2012), Egis

Based on the above projections and based on the National Water Demand projection by the National Commission on Integrated Water Resources Development (NCWIRD-India) for a period of 2050 as mentioned by the Steering Committee on Water Resources – Planning Commission (2007-2012) is also considered for estimating the overall and sectoral demand of the BMEC states and the region. The sector wise split on overall water demand based on the trend of surface water usage is as given below:

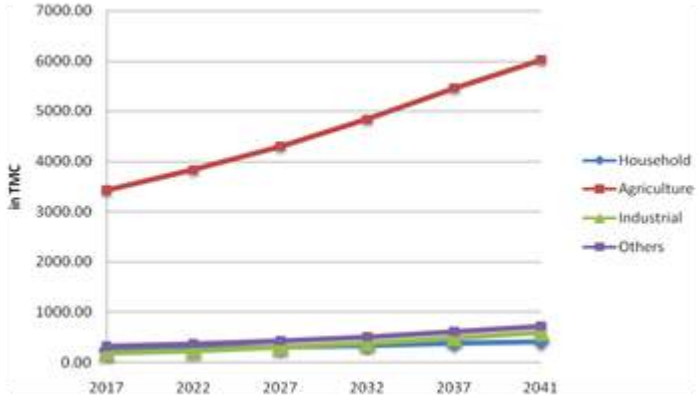
Figure: Sector wise split on over all water demand, 2041 & Sector wise CAGR (2017-41)



Source: Planning commission state development report, Steering Committee on Water Resources – Planning Commission (2007-2012), Egis

In the projected scenario for 2041, It is estimated that the total water demand will grow at a compound annual growth rate of 2.5 from 2017 till 2041 and the water demand for industrial sector will grow at a compound annual growth rate of about 4.81% which is comparatively higher than that the overall growth rate of other sectors.

Figure: Sector wise growth rate of water demand-BMEC states, 2041



Source: Planning commission state development report, Steering Committee on Water Resources – Planning Commission (2007-2012), Egis

Domestic Water Demand of BMEC

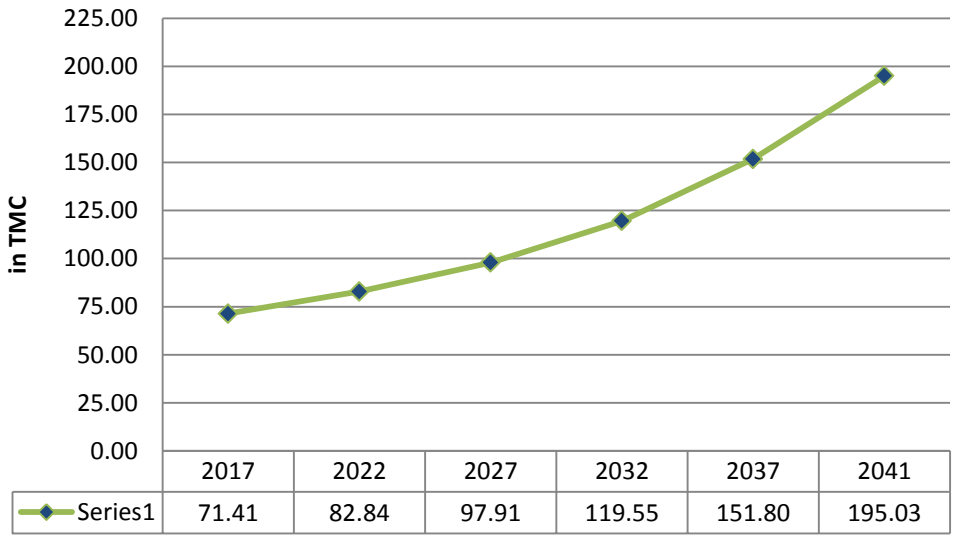
The domestic water demand for the BMEC region is estimated based on the population projected for the entire region. **It is projected that by 2014, the BMEC will have a population of 123.4 million (under employment based scenario)**.

Within the BMEC region the following assumptions are considered for the projections of the domestic water supply for 2041:

- For the estimated urban population, on an average the per capita water demand of 135 lpcd is considered.
- The rural population is assumed to be supplied with a per-capita average of 100 lpcd of water
- By 2041, 100% coverage is expected in the region with minimum UFW & water losses.

Based on the above mentioned assumptions, the total domestic water demand projected for the BMEC is as given below:

Figure: Domestic water demand for BMEC region, 2017-2041



	2017	2022	2027	2032	2037	2041
Series1	71.41	82.84	97.91	119.55	151.80	195.03

Source: Egis

As can be seen the **total domestic water demand for the entire BMEC core region is about 195.03 TMC, with an average hike of about 10 TMCs in absolute terms every years in the last 5 years of the horizon period.** Out of the total 195.03 TMC of water about 98.48 TMC is of Karnataka and about 96.55 TMC is of Maharashtra. Given below is the water demand state wise split in domestic sector for 5 years interval from 2017 to 2041.

Table 13-1: Water demand projection in domestic sector, BMEC region (2017-2041)

State AOIs	Water demand in domestic sector in MLD (TMC)					
	2017	2022	2027	2032	2037	2041
Karnataka	2,692 (34.7)	3,217 (41.47)	3,913 (50.43)	4,835 (62.32)	6,090 (78.50)	7,640 (98.48)
Maharashtra	2,848 (36.71)	3,210 (41.37)	3,683 (47.48)	4,440 (57.23)	5,687 (73.30)	7,491 (96.55)
Total	5,540 (71.41)	6,427 (82.84)	7,596 (97.91)	9,275 (119.55)	11,777 (151.80)	15,131 (195.03)

Source: Egis

Given below is the five year split up from 2017 to 2041 of domestic water requirement in the BMEC districts:

Table: Domestic Water Demand- BMEC districts 2017-2041

	Core district	2017	2022	2027	2032	2037	2041
Karnataka Region	Bagalkot	**191** (2.47)	**233** (3.00)	**288** (3.71)	**360** (4.64)	**457** (5.89)	**587** (7.57)
	Belagavi	**597** (7.69)	**717** (9.25)	**876** (11.29)	**1,089** (14.04)	**1,383** (17.83)	**1,695** (21.85)
	Ballari	**343** (4.42)	**408** (5.26)	**501** (6.46)	**630** (8.12)	**810** (10.44)	**1,099** (14.17)
	Chikkamagaluru	**90** (1.16)	**120** (1.54)	**161** (2.08)	**218** (2.80)	**295** (3.81)	**393** (5.07)
	Chitradurga	**247** (3.19)	**288** (3.72)	**339** (4.37)	**404** (5.21)	**490** (6.32)	**577** (7.44)
	Davanagere	**263** (3.38)	**306** (3.94)	**359** (4.63)	**428** (5.51)	**518** (6.68)	**610** (7.86)
	Dharwad	**254** (3.27	**304** (3.92)	**372** (4.79)	**464** (5.99)	**593** (7.65)	**732** (9.44)
	Gadag	**148** (1.91)	**172** (2.22)	**204** (2.62)	**245** (3.15)	**299** (3.86)	**377** (4.86)
	Hassan	**198** (2.55)	**247** (3.19)	**318** (4.10)	**413** (5.32)	**542** (6.99)	**727** (9.37)
	Haveri	**210** (2.70)	**241** (3.11)	**280** (3.61)	**328** (4.23)	**390** (5.03)	**469** (6.04)
	Koppal	**153** (1.97)	**180** (2.32)	**215** (2.77)	**257** (3.32)	**311** (4.01)	**375** (4.83)
Maharashtra Region	Kolhapur	**377** (4.86)	**431** (5.55)	**507** (6.54)	**628** (8.09)	**828** (10.67)	**1,211** (15.61)

	Pune	**1,282** (16.52)	1,485 (19.14)	**1,761** (22.70)	**2,211** (28.50)	**2,953** (38.06)	**3,831** (49.39)
	Sangli	**328** (4.23)	**365** (4.70)	**408** (5.26)	**474** (6.11)	**580** (7.47)	**768** (9.90)
	Satara	**326** (4.20)	**355** (4.57)	**384** (4.96)	**426** (5.49)	**491** (6.33)	**593** (7.64)
	Solapur	**535** (6.89)	**574** (7.40)	**623** (8.03)	**701** (9.04)	**835** (10.77)	**1,087** (14.01)

Source: Egis

When compared with the total water demand projections of the States by the Planning commission on the basis of usage of surface water, the following points need to be understood:

- Currently the entire water demand is not met through the surface water. Currently a good share of the household demand of the States is met through ground water resources. Hence the demand projected on the basis of the trend of usage of the utilizable surface water will have only about 50% share of the overall required water for domestic purposes.
- As per the NCIWRD projections on the water demand share of the domestic/household sector, it is estimated that by **2050 the share will be about 10% of the total demand of water.** The total water demand for domestic sector computed for the **BMEC core region**, on the basis of **population projection forms about 2. 5% of the total surface water demand.** It is expected that the rest of **Maharashtra and Karnataka will have more than 50% share of the total water demand thus forming about 10%** of the domestic sector share in the total water demand which are in lines with the projections of NCIWRD.
- The agriculture irrigation sector suffers from deficient infrastructure (due to insufficient maintenance and lack of water control structures), management constraints (low service quality of operators), and limited promotion of water saving crops and practices. **Thus on the basis of the planning commission's projections on current share of water utilization by this sector, by 2041 it is estimated to be 78% of the total demand if the current trend continues.**
- It is assumed that by 2041, the share of the water demand by the agriculture sector will decrease by improving irrigation water productivity through (i) increasing water use efficiency, (ii) reducing the gap between the actual and potential area that can be irrigated, and (iii) promoting water efficient techniques and technologies like drip irrigation/ micro irrigation system. These measures will bring down the demand of agriculture sector by at least 5 -8% as projected by the NCWIRD. It is expected that the volume of water saved in the agriculture sector will be utilized for the domestic water supply thus shifting the stress on ground water and increasing the share of usage by domestic sector on surface water sources to meet the demand.
- As mentioned earlier in this section, currently there is no 100% coverage of population in terms of piped water supply and the per capita water supply per day is not as per the CPHEEO guidelines. It is expected that by 2041 by improving the water resource management and supply systems, 100% coverage of population is achieved with an average per capita water supply of 135 lpcd for urban areas and 100 lpcd for the rest of the areas thus totalling upto 195 TMC as the overall water demand for the BMEC core by 2041.

Industrial Water Demand

As per the existing scenario, Industrial water demand projections for 2041 for Karnataka and Maharashtra together would be around 5.17% of the total water demand met by the surface water which is around 389 TMC.

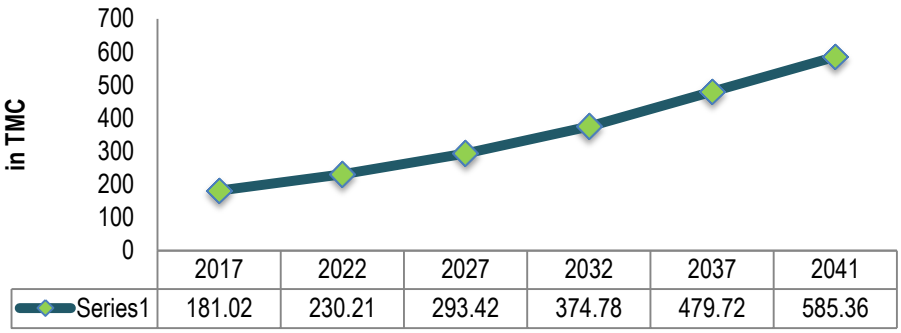
However it is estimated that by 2041 the industrial water share out of the total water demand met by the surface water will increase from 5.17% to about 7.6% thus reducing the pressure on the ground water sources. The industrial water requirement by 2041 for the states of Karnataka and Maharashtra is as given below:

Table: Over all Industrial Water demand, 2041 for Karnataka and Maharashtra

State	2041 *(in TMC)*
Industrial Water demand - Karnataka	232.28
Industrial Water demand- Maharashtra	353.08
Total Industrial water demand	**585.36**

Source: Egis

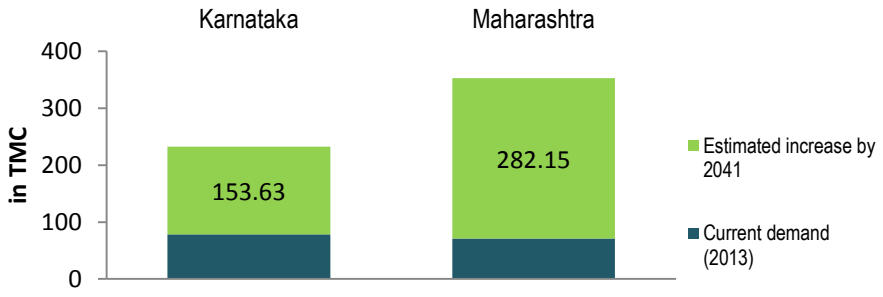
Figure: Overall water demand growth of industrial sector (2017-2041)



Source: Egis

As pre the estimates, the additional demand for industrial water in absolute terms from 2013 to 2041 by the industrial sector is estimated to be 153.63 TMC for Karnataka and 282.15 TMC in Maharashtra. The figure below illustrates the total water demand and the estimated additional demand in absolute terms for both the states.

Figure: Industrial Water demand for Karnataka and Maharashtra, 2041



Source: Egis

Industrial Water Demand of BMEC Region/Core Districts

The Industrial water demand due to proposed Industrial development across the region is carried out through the following method:

Sector wise Land based Industrial Water Demand: Water demand projections are based on benchmarks of various industrial sectoral water demands and based on Industrial Land demand projected under each sector for each of the core districts. This estimation will provide district wise additional industrial water demand.

The water demand estimated through this Scenario indicates a Total Industrial Water Demand of around 59 TMC (27.77 TMC under Karnataka& 31.24 TMC under Maharashtra). The table given below shows the additional industrial water demand in the core region of Karnataka, Maharashtra and the BMEC core region as a whole.

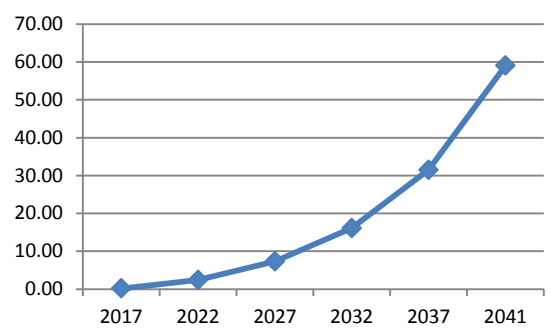
Table 13-2: Induced Additional Industrial water demand for BMEC core districts

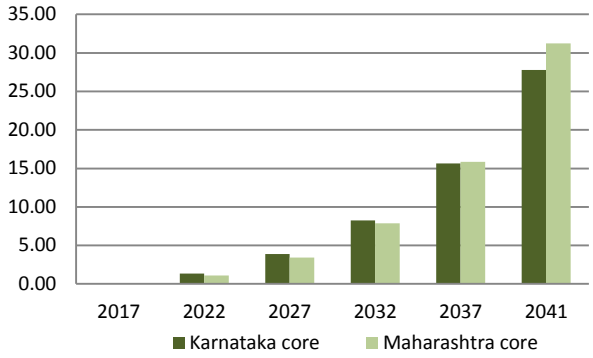
State AOIs	Water demand in industrial sector in MLD (TMC)					
	2017	2022	2027	2032	2037	2041
Karnataka	7.57 (0.10)	102.88 (1.33)	299.98 (3.87)	638.50 (8.23)	1214.04 (15.65)	2154.03 (27.77)
Maharashtra	4.47 (0.06)	84.76 (1.09)	266.13 (3.43)	609.33 (7.85)	1228.24 (15.83)	2423.24 (31.24)
Total	12.04 (0.16)	187.64 (2.42)	566.11 (7.30)	1247.83 (16.08)	2442.29 (31.48)	4577.26 (59)

Source: Egis, Crisil

The overall growth of the core district's industrial water demand & State wise break-up of industrial water demand at 5 year interval & the district wise water demand at 2041 is provided in the following illustrations:

Figure: Core region's induced industrial water demand (2017-2041) at 5 Yrs interval & State's Share





Source: Egis, Crisil

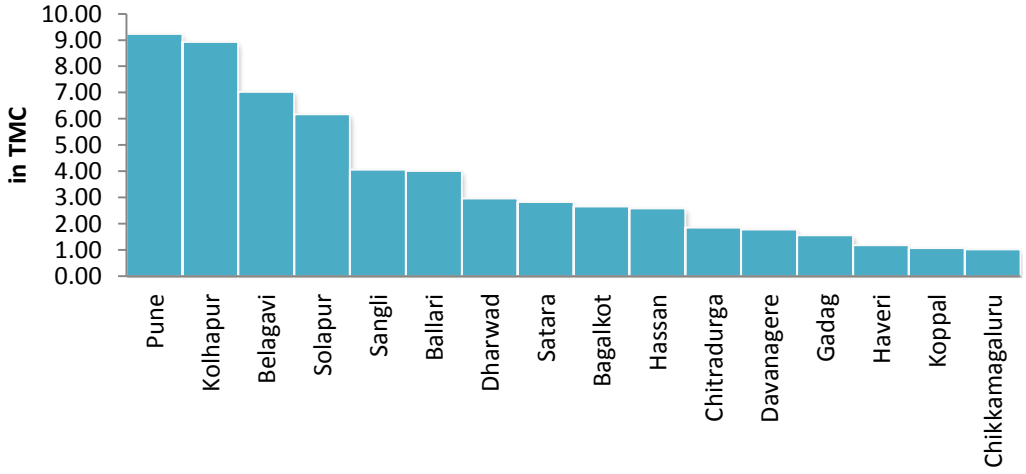
Table: Core district wise split of induced industrial water demand for 201-2041

State	Industrial Water Demand Projections at 5 yrs interval (TMC)						
	Districts	2017	2022	2027	2032	2037	2041
Karnataka	Chitradurga	**0.75** (0.01)	**8.91** (0.11)	**23.63** (0.30)	**48.50** (0.63)	**91.21** (1.18)	**143.74** (1.85)
	Davanagere	**0.83** (0.01)	**8.38** (0.11)	**22.44** (0.29)	**46.50** (0.60)	**87.64** (1.13)	**138.69** (1.79)
	Haveri	**0.07** (0.001)	**3.44** (0.04)	**10.77** (0.14)	**23.73** (0.31)	**45.69** (0.59)	**91.92** (1.18)
	Dharwad	**1.64** (0.02)	**13.70** (0.18)	**37.42** (0.48)	**77.76** (1.00)	**145.43** (1.87)	**230.26** (2.97)
	Belagavi	**3.59** (0.05)	**33.82** (0.44)	**89.19** (1.15)	**184.59** (2.38)	**345.32** (4.45)	**545.45** (7.03)
	Ballari	**0.23** (0.003)	**10.89** (0.14)	**36.25** (0.47)	**80.05** (1.03)	**154.49** (1.99)	**311.39** (4.01)
	Gadag	**0.09** (0.001)	**4.02** (0.05)	**13.90** (0.18)	**31.30** (0.40)	**60.20** (0.78)	**121.53** (1.57)
	Koppal	**0.06** (0.001)	**2.79** (0.04)	**9.94** (0.13)	**21.27** (0.27)	**41.67** (0.54)	**83.81** (1.08)
	Bagalkot	**0.14** (0.002)	**7.27** (0.09)	**23.92** (0.31)	**52.90** (0.68)	**102.77** (1.32)	**206.54** (2.66)
	Hassan	**0.11**	**6.63**	**23.50**	**51.74**	**100.02**	**201.18**

		(0.001)	(0.09)	(0.30)	(0.67)	(1.29)	(2.59)
	Chikkamagaluru	**0.07** (0.001)	**3.02** (0.04)	**9.03** (0.12)	**20.18** (0.26)	**39.61** (0.51)	**79.51** (1.02)
Maharashtra	Kolhapur	**0.40** (0.01)	**19.75** (0.25)	**67.29** (0.87)	**157.86** (2.03)	**322.33** (4.15)	**692.71** (8.93)
	Sangli	**0.19** (0.002)	**9.22** (0.12)	**30.55** (0.39)	**71.99** (0.93)	**146.54** (1.89)	**315.15** (4.06)
	Satara	**0.10** (0.001)	**6.20** (0.08)	**21.30** (0.27)	**50.16** (0.65)	**102.06** (1.32)	**219.46** (2.83)
	Solapur	**0.25** (0.003)	**13.11** (0.17)	**46.66** (0.60)	**109.47** (1.41)	**223.19** (2.88)	**479.38** (6.18)
Total		12.04 (0.16)	**187.64** (2.42)	**566.11** (7.30)	1247.83 (16.08)	**2442.29** (31.48)	**4577.26** (59.00)

Source : Egis, Crisil

Figure: Core district wise split of induced industrial water demand, 2041



Source: Egis, Crisil

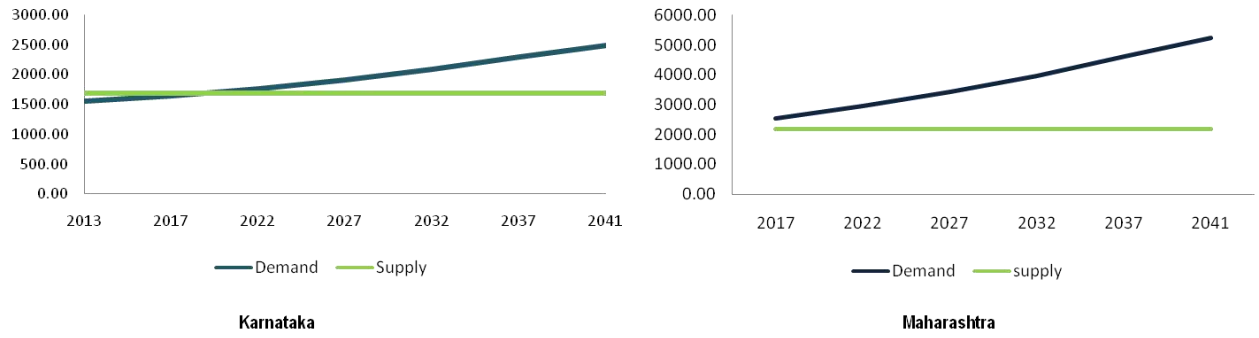
As can be seen from the figure, in Karnataka part of the BMEC region, Belagavi followed by Ballari and Dharwad will be the highest consumers of Induced Industrial water demand. In case of Maharashtra, Pune district will be the highest consumer with a requirement of about 9.24 TMC. However, based on finalisation of Industrial node location and the finalised list of industries, there will be slight change in the district wise consumption pattern illustrated above.

13.7.3 Water Demand Gap Assessment

Considering the supply (in terms of surface water) remains constant, the gap is assessed from 2017 till 2041and it's observed that the demand exceeds the supply by 2020 in Karnataka and in

Maharashtra it is observed that currently the total demand of water exceeds the total supply in Maharashtra. The graphs below illustrate the same.

Figure: Water Supply Demand Gap of Karnataka & Maharashtra



Source: Water resource department, GoK & GoM, Planning commission projections, NCWIRD, Analysis- Egis

As per the projections, by 2020, the total water demand in Karnataka will be 1712.3 TMC where as the surface water supply availed is only 1690.3 TMC, clearly indicating a gap of 22 TMC less on the supply side. The water demand gap assessment of the state of Maharashtra considering the surface water resources is carried out and as per the estimates; it is observed that currently the total demand of water exceeds the total supply in Maharashtra. By the estimations and assessment the total water demand in Maharashtra in 2017 will be about 2524.6 TMC where as the supply of surface water availed is only about 2181.8 TMC, indicating a deficit of 342.79 TMC. It is to be noted that the estimations and forecasts carried out on the supply demand gap is based on the surface water availability alone. Since the ground water availability of the state is also declining, it is to be understood that this is an alarming situation. The deficit in the water supply against the projected demand of both the States till 2041 is as given below:

Figure: Water Supply Demand Gap, Karnataka & Maharashtra

Year	2017	2022	2027	2032	2037	2041
Karnataka	50.75	-74.28	-220.29	-392.76	-598.77	-793.84
Maharashtra	-342.79	-748.54	-1225.21	-1786.02	-2446.95	-3060.61

All values are in TMC

Source: Water Resource Department, GoK & GoM, Planning commission projections, NCWIRD, Analysis- Egis

A deficit of 793.84 TMC &3060.6 TMC is estimated for the States of Karnataka & Maharashtra respectively by 2041. Hence proper planning and strategising of the water resource management, supply systems and the improvement of efficient usage of water in various sectors have to be identified.

13.7.4 Green strategies and conservation measures towards sustainability

The rising demand of water is a major challenge which and needs to be addressed to promote a sustainable economic growth. An integrated approach to water resources management promotes the coordinated development and management of resources to maximize more equitable economic and social development, without compromising on the environment. An integrated approach to water resources management is a means to reconcile varied and changing water uses and demands since it

provides greater flexibility and adaptive capacity than conventional water resources management approaches[10].

Although there is need to identify appropriate sources to supply the additional water demand this section gives a brief of various strategies and measures to be adopted to improve the water resource management.

Management strategies in Industrial sector:

- Use of treated water from STPs of urban centres would be one of the major sources of water to narrow the gap between demand & supply. Just by considering the domestic water **demand of the BMEC region (inclusive of urban and rural), the treated water which would be made available by 2017 & by 2041 would be around 46 to 125 TMC, which is more than the total additional industrial water demands of the region. The below shows the domestic water consumption of the BMEC core region with potential treated water availability**

Table: Availability of Treated Water from Urban Centres of BMEC region

	2017	2022	2027	2032	2037	2041
Domestic water consumption	71.41	82.84	97.91	119.55	151.80	195.03
Sewage available for recycling from domestic consumption	57.13	66.27	78.33	95.64	121.44	156.03
Potential availability of treated water from STPs	45.70	53.02	62.66	76.51	97.15	124.82

All values are in TMC.

If only water from urban areas are considered, from the total urban domestic water consumption by 2041 of 138.5 TMC, sewage available for recycling will be about 111 TMC and the potential availability of treated water from STPs will be about 89 TMC. Given below is the table showing the treated water availability from urban areas:

Table: Availability of Treated Water from urban areas of BMEC core region

	2017	2022	2027	2032	2037	2041
Domestic water consumption	33.16	41.65	53.70	71.79	99.42	138.52
Sewage available for recycling from domestic consumption	26.53	33.32	42.96	57.44	79.54	110.81
Potential availability of treated water from STPs	21.22	26.65	34.37	45.95	63.63	88.65

All values are in TMC.

- **Apart from treated water from urban centers, treated water from ETPs & other industrial waste water can also be utilised to bring down the overall demand and the same would be demonstrated in subsequent stages.** More than 30% of the industrial water demand can be meet through use of treated wastewater for industrial process like ash handling (in case of thermal power plants); washing of ores etc should be explored.
- Smart water networks for Industrial water supply would also improve the efficiency of water usage by minimising UFWs & other water losses
- Commercial and industrial cooling tower water/ energy retrofits should be implemented.

[10] ADB 2014

- Water reuse and recycling practices reduce production demands on the water system. Water utilities should work with their non residential customers to identify potential areas for reuse or recycling. Some industries can substantially reduce water demand through water reuse (or multiple uses) in manufacturing processes.
- Rainwater harvesting methodologies can supply at least 5 to 10% of the total industrial demand

Managing water in and habitat settings

- Smart water networks in urban water supply would also improve the efficiency of water usage by minimising UFWs & other water losses and can save more than 5% to 10% of the total domestic demand
- Municipal water utility leak detection and system water loss reduction programs to be implemented resulting in Improvement of service delivery.
- Implementation of rain water harvesting can also bring down the total domestic demand by another 5 to 10%

Agriculture Sector Management and efficiency improvement:

The major consumer of water is the agriculture sector for irrigation. The major issues associated with this sector are lower cropping intensities and inefficient usage of water leading to irrigation of only a share of the potential area. Irrigation water productivity is required to be increased. The various strategies to be adopted are:

- Increasing water use efficiency
- Reducing the gap between the actual and potential area that can be irrigated
- Promoting water efficient techniques and technologies like drip irrigation/ micro irrigation which can bring down the consumption even up to 40%.
- The water loses in the existing irrigation canals system is more than 60% in Maharashtra and its almost same in Karnataka. These loses are due to evaporation, leakages, percolation losses & pilferages. Enhancement of the irrigation infrastructure can save more than 40 to 50% of water consumed under agriculture sector.
- Introduction of Micro Irrigation System & improvement of irrigation infrastructure of agriculture sector, is seen as one of the crucial part of water management and expected to save water, which will make water available for other sectors, primarily Industries & Domestic/ Drinking water supply. Hence, the water infrastructure proposals for development of Industrial Nodes shall also cover the cost of infrastructure required to establish Micro Irrigation system & improving the overall irrigation infrastructure in its immediate surroundings. This integrated water management & infrastructure development shall be explored to be considered as part of water infrastructure development of BMEC.
- Efforts to be done on increasing the crop efficiency and productivity.
- Water efficiency can also be achieved through farm management through land preparation by levelling increasing water productivity
- Through these methods it is assumed that 30-50% of water consumption in agriculture can be brought down over a period of time.

Augmenting the existing water resources:

- **Potential of West Flowing Rivers:** Currently only 13%& 10% of the water potential of the west flowing rivers of Karnataka & Maharashtra respectively are harnessed as a source of utilizable water. The major obstacle in trapping the west flowing river is the topography & Western Ghats related environmental issues. More than 2000 TMC of west flowing river drain into Arabian Sea only from the State of Karnataka& the water getting drained into sea from west flowing rivers of Maharashtra is also around same volume. If we can utilise even 20% of the total water available, it will fulfil all the additional future demand of the State the respective States. The main challenge required would be to pump the water cross the Western Ghats (around 600 to 900 meters above MSL) to reach the BMEC region. This needs engineering innovativeness supported with technological advancement. The possibility of re directing the required water from west flowing rivers across Western Ghats through the proposed transportation routes & tunnels can be explored.
- **Utilising Water used for Power Generation.** Currently the hydro projects on west flowing river also drains the water into the sea, efficient planning & engineering can facilitate using this water after power generation. Water from Kiona dam in Maharashtra drains around 67 TMC of water after power generation. Similarly, number of Hydro power projects located in Western Ghats of Karnataka, including Saravathy Hydro project, drains water into the sea, utilisation of these waters can be explored.
- River basin wise planning and management for optimum utilization of water should be implemented.

City/ node level other green strategies/ development approaches towards sustainability

a) LID (Low Impact Development)

Introducing Low Impact Development (LID) to land development in case of Greenfield nodes and land redevelopment in case of Brownfield nodes. LID is a management approach and set of practices that can reduce runoff and pollutant loadings by managing runoff as close to its source(s) as possible. LID includes overall site design approaches (holistic LID, or LID integrated management practices) and individual small-scale storm water management practices (isolated LID practices) that promote the use of natural systems for infiltration, evapo-transpiration and the harvesting and use of rainwater. Although both holistic LID and isolated LID practices can remove pollutants and reduce damaging storm water flows (volume and velocity), holistic approaches maximize these benefits.

By adding LID solutions, communities can help their watersheds act more efficient by reducing run off by 40-45%, increasing shallow infiltration & evopo-transpiration by 10% each and increasing deep infiltration by 20%. LID practices such as natural or man-made swales, depressions and vegetated areas capture and retain water onsite, allowing time for water to soak into the soil where it is naturally filtered. This could be achieved in institutional and industrial campuses as the preliminary phase and slowly to the other public spaces and private properties. The achieved results are:

- **Improved Groundwater Recharge**
- **Improved Water Quality**
- **Mitigate urban heat island effect**
- **Reducing energy costs**

It is to be noted that direct infiltration in a brown filed site may introduce pollutant loads to ground water and hence green infrastructure technologies to be implemented and thus avoiding pollutant load contaminating water

b) Introducing environment responsibility targets to large campuses/ institutions/industries. Some of targets would be reduction of water consumption per occupied room by 20% through proper data base, monitoring and management. Introduction of smart technology systems for data analysis is important here.

c) Collaborating industries to fund an area's agricultural drip, micro irrigation facilities saving the water consumed thus diverting the excess amount to the industries.

d) Smart growth planning: Relying on planning principles like introducing compact building design, higher densities to prevent sprawl and efficient infrastructure will reduce the losses, improve efficiency in supply. Introduction of monitoring mechanisms are also important.

e) Introduce a water efficient certification for buildings exploring models such as that of Singapore model[11] of water management. The Water Efficient Building (WEB) Certification launched in 2004 encourages businesses, industries, schools and buildings from the non-domestic sector to include water efficient measures in their premises and processes. The WEB Certification is also recognised under the Green Mark Certification scheme for buildings. The WEB (Basic) Certification can be obtained by installing water efficient fittings and adopting water efficient flow rates/flush volumes as per the area of use and the rate/volume fixed under the WEB.

Singapore model of water management towards sustainability: In just five decades, Singapore has overcome water shortages despite its lack of natural water resources and pollution in its rivers. Driven by a vision of what it takes to be sustainable in water, Singapore has been investing in research and technology. Today, the nation has built a robust, diversified and sustainable water supply from four different sources known as the Four National Taps (water from local catchment areas, imported water, reclaimed water known as NEWater and desalinated water). By integrating the system and maximising the efficiency of each of the four taps, Singapore has ensured a stable, sustainable water supply that is weather resilient, capable of catering to the country's continued growth.

Performance targets by 2041: The various goals identified within this chapter is comprehended in this section along with identifying subsequent performance targets for the horizon period of 2041. The various performance targets identified within the chapter are as given below:

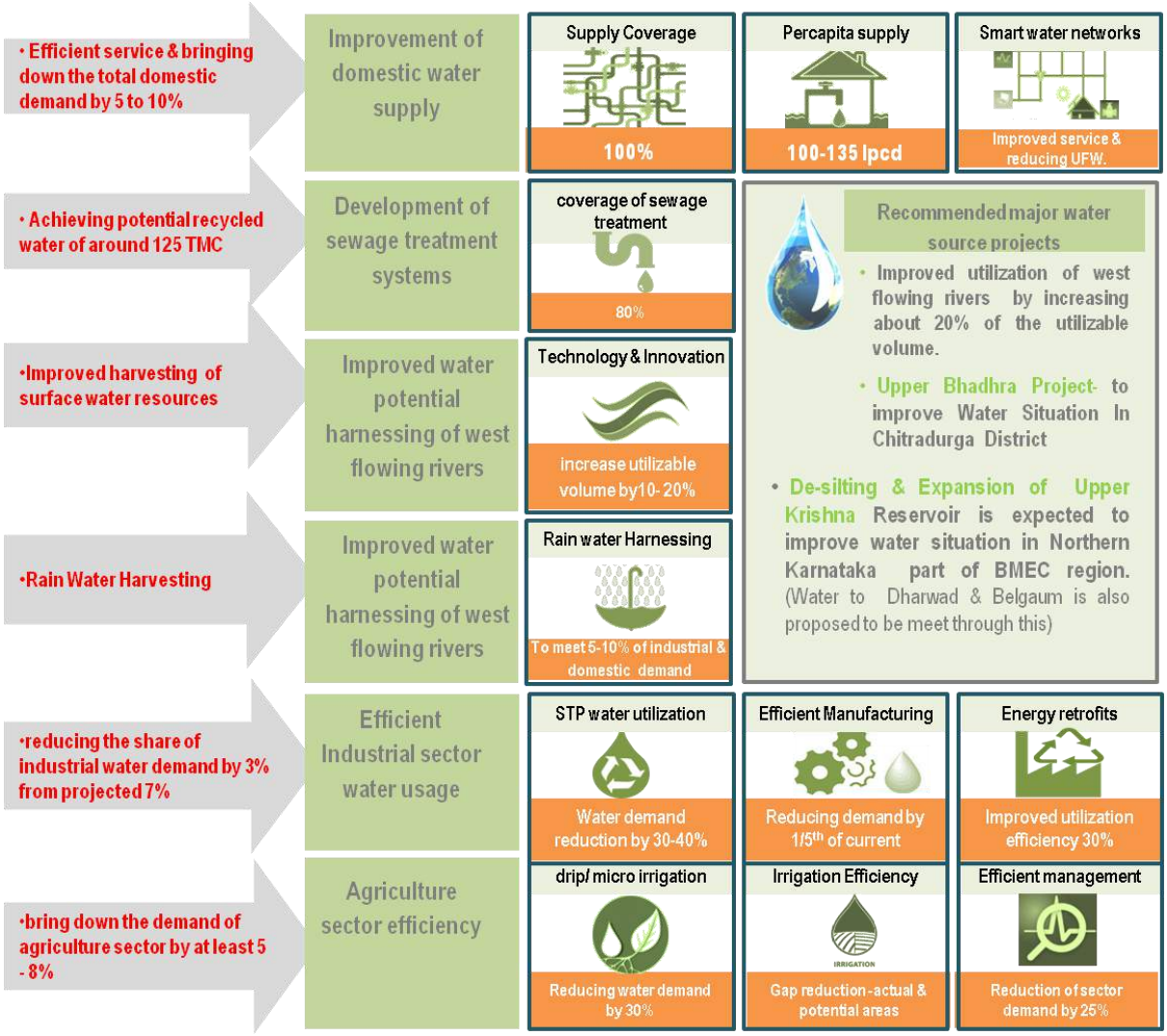
Goal	Targets
Improvement of domestic water supply	100% coverage of population in terms of supply
	Per capita water supply for urban areas at an average of 135 lpcd & other areas at 100 lpcd
	Improving service delivery and reducing UFW through Smart water networks.
Development of sewage treatment systems	Achieving 80% coverage of sewage treatment by 2041

[11] www.pub.gov.sg

Efficient Industrial sector water usage	Utilizing the treated water available from the STPs for industrial usage with 100% efficiency, thus reducing the industrial water demand by at least 30 to 40% on the total water demand or reducing the share of industrial water demand by 3% from projected 7%
	Reducing the unit consumption of water by improving the efficiency in manufacturing process by at least 1/5th of the current usage.
	Increasing efficiency in utilization of water by at least 30% by using cooling water towers and other energy retrofits.
	Adopting Rain Water Harvesting systems to achieve at least 2 to 5% of the required fresh water demand of the industrial use
Improved efficiency in agriculture sector water utilization	Through drip/ micro irrigation methods, reducing the agriculture water demand by 30%. Reducing the gap between the actual and potential areas to be irrigated.
	Reducing water losses due to irrigation system by improving irrigation infrastructure, to reduce the losses to less than 20% from existing level of more than 60%
	Reducing the overall water demand of the sector by at least by 25%
Improved harnessing of water potential of west flowing rivers	Improving the utilizable water volume of the west flowing rivers from 13% to at least 30%, expecting a 10% to 20% increase in the utilizable volume.
Strategies for Integrated development of Industrial & Agriculture Water Infrastructure	Implementing Strategies to integrate water infrastructure of Industrial water requirement with infrastructure requirement for improving irrigation systems & establishing micro irrigation systems around the proposed industrial node needs to be framed and implemented.

Given below is the graphical representation of the major performance targets and the recommended projects.

Figure: Performance targets in water sector



Source: Egis

It is expected that by following the above parameters the supply demand gap identified can be reduced and met.

13.8 HOUSING

Total number of housing units required in BMEC core region is estimated to be around 20.3 million units for the plan period (2017-2041) and the share of Karnataka and Maharashtra is about 51.9% and 48.1% respectively. Out of the total demand estimated, the **housing demand of proposed Industrial nodes of BMEC by 2041 is around 8.1 million units.**

13.8.1 Housing demand estimations in BMEC

Additional housing requirements for BMEC core region can be classified into two major components viz. Housing demand due to induced scenario in existing urban centres & rural area and in the proposed Greenfield Industrial Nodes.

Additional housing units required for development scenario outlined in BMEC Perspective Plan is **estimated to be around 20.3 million by 2041.Out of which, the housing demand of the region due**

to urbanisation of existing Urban & Rural centres is estimated to be around (which is other than demand due to nodes) 12.2 million, which is 60% of the total housing demand. This signifies the need to strengthen existing urban centres of BMEC region through Sub-Regional plans and Brownfield developments. The balance 8.1 million units are the demand due proposed ten Greenfield Industrial nodes.

Housing Demand due to Induced scenario

As mentioned above, the housing demand in the BMEC region for the Plan period can be classified into two distinct components, viz., demand due to Business Induced population growth, in the region and in the proposed Greenfield Industrial Nodes. By 2041, apopulation of about 30.5 million is proposed to be accommodated in ten (10) Industrial nodes cum mega cities and the balance additional population of 51.5 million is to be accommodated in the rest of the region. Household size were assumed to be 4.81 in Karnataka and 4.59 in Maharashtra based on State level average of the BMEC core region, while in Industrial Nodes, it is assumed to be three (3), based on benchmarking of similar Greenfield developments. Statewise additional housing units required in BMEC core region is given in the table below.

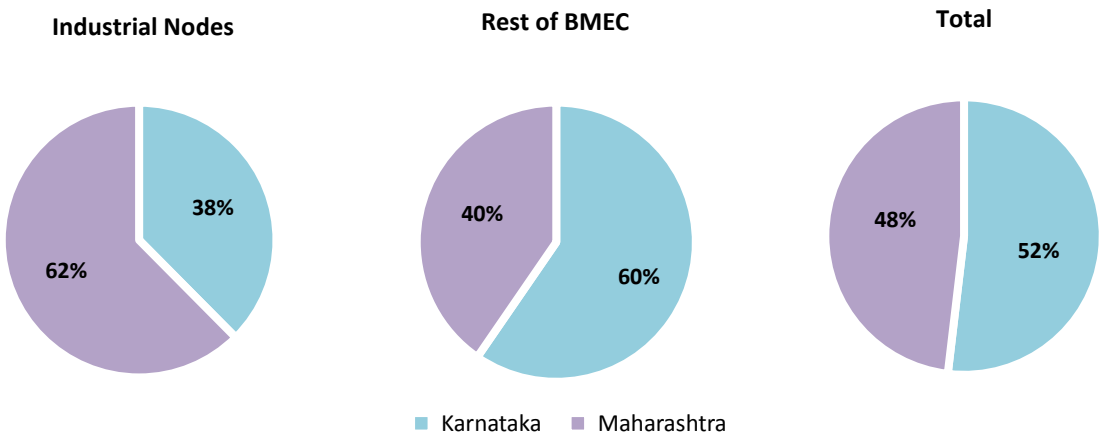
Table: Estimated Housing units required in BMEC Region

States	Nodes/Rest of Region	2011-17	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka (million units)	*Industrial Nodes*	0.02	0.17	0.32	0.52	0.82	1.21	3.1
	Rest of BMEC	1.01	0.82	1.01	1.25	1.61	1.80	7.5
Maharashtra (million units)	*Industrial Nodes*	0.03	0.26	0.50	0.85	1.41	2.04	5.1
	Rest of BMEC	0.52	0.42	0.43	0.66	1.10	1.58	4.7
BMEC (million units)		**1.57**	**1.67**	**2.25**	**3.28**	**4.93**	**6.63**	**20.3**

Source: Egis

Estimated requirement for additional housing units in the BMEC core region is about 20.3 million, in which the share of Karnataka and Maharashtra is 10.6 million and 9.8 million respectively. Major share of about 40% of the total demand in BMEC core region, which is around 8.2 million, is the projected demand in the proposed Industrial Node cum mega cities.

Figure: Housing Requirements in BMEC Region

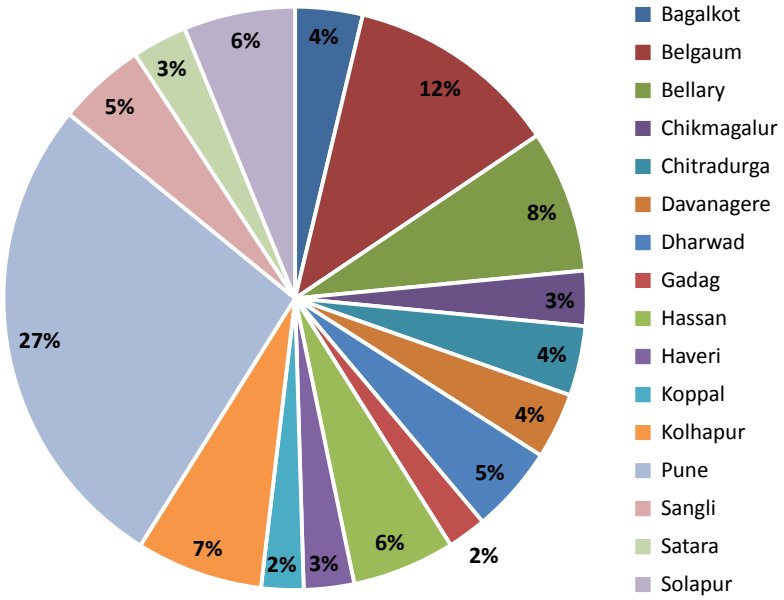


Source: Egis (units in million)

District wise Housing demand in BMEC region

Belagavi district with an estimated demand of 2.41 million, accounts for a maximum share in the State of Karnataka which has a total demand of about 10.6 million. The share of housing demand in Pune district is about 27% of the total BMEC demand and accounts for 56.1% of the demand in the state of Maharashtra.

Figure: District Wise Share of Housing Demand



Source: Egis

13.8.2 Housing Demand under Economic Groups for BMEC region

Estimated number of housing units required in economically weaker section category in BMEC region is 6.8 million, out of which Phase I (2017-22) requirement is about 1.08 million, which is 15.9% of the total demand. The share of Karnataka and Maharashtra in total demand is 3.5 million and 3.3 million respectively.

Table: Estimated housing demand in Economically Weaker Section

States	(in million units)	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka	Industrial Nodes	0.06	0.11	0.17	0.27	0.40	1.0
	Rest of BMEC	0.61	0.34	0.42	0.54	0.60	2.5
	Total	*0.67*	*0.44*	*0.59*	*0.81*	*1.00*	*3.5*
Maharashtra	Industrial Nodes	0.10	0.17	0.28	0.47	0.68	1.7
	Rest of BMEC	0.31	0.14	0.22	0.37	0.53	1.6
	Total	*0.41*	*0.31*	*0.50*	*0.84*	*1.21*	*3.3*
BMEC Core		**1.08**	**0.75**	**1.09**	**1.64**	**2.21**	**6.8**

Source: Egis

Low Income Group housing demand in BMEC region is estimated to be around 9.5 million units in which Karnataka and Maharashtra accounts for 4.9 million and 4.6 million. Phase I demand of this

category of housing demand is about 1.51 million in which Karnataka and Maharashtra account for 0.94 million and 0.57 million respectively.

Table: Estimated housing demand in Low Income Group category

States	(in million units)	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka	Industrial Nodes	0.09	0.15	0.24	0.38	0.57	1.4
	Rest of BMEC	0.85	0.47	0.58	0.75	0.84	3.5
	Total	*0.94*	*0.62*	*0.83*	*1.13*	*1.41*	*4.9*
Maharashtra	Industrial Nodes	0.14	0.23	0.40	0.66	0.95	2.4
	Rest of BMEC	0.44	0.20	0.31	0.51	0.74	2.2
	Total	*0.57*	*0.43*	*0.70*	*1.17*	*1.69*	*4.6*
BMEC Core		**1.51**	**1.05**	**1.53**	**2.30**	**3.10**	**9.5**

Source: Egis

Middle income group and above categories which accounts for 4.1 million housing demand in BMEC region in which Karnataka and Maharashtra account for 2,1 million and 2 million respectively.

Table: Estimated housing demand in Middle Income Group & above categories

States	(in million units)	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka	Industrial Nodes	0.04	0.06	0.10	0.16	0.24	0.6
	Rest of BMEC	0.37	0.20	0.25	0.32	0.36	1.5
	Total	*0.40*	*0.27*	*0.35*	*0.49*	*0.60*	*2.1*
Maharashtra	Industrial Nodes	0.06	0.10	0.17	0.28	0.41	1.0
	Rest of BMEC	0.19	0.09	0.13	0.22	0.32	0.9
	Total	*0.25*	*0.19*	*0.30*	*0.50*	*0.72*	*2.0*
BMEC Core		**0.65**	**0.45**	**0.66**	**0.99**	**1.33**	**4.1**

Source: Egis

Industrial node wise break-up of each economic housing categories, is provided in the subsequent chapter.

Estimation of housing demand under LIG & EWS to be meet through various Government Initiatives: National Urban Housing & Habitat Policy 2007 mandates reservation of 10-15 percent land in new public/ private housing projects or 20-25 percent of FAR (whichever is greater) for EWS/ LIG housing through appropriate legal stipulations and special initiatives. Housing demand gap in EWS and LIG categories addresses the requirement in respective economic categories in addition to 20-25% FAR reservation in EWS/LIG in all housing projects. The reservation applies to housing project developed to meet the demand of MIG & HIG groups through private investments. It is assumed that out 25% FAR allocations in such housing projects, 10% goes to EWS housing and 15% goes to LIG housing. Based on these assumptions, the housing demand gap in EWS and LIG categories is estimated to be around 25-32%. Further, the housing demand gap to be met in EWS and LIG were estimated to be 5% and 27% respectively. This shortage needs to be met by development through various Industrial housing & government housing schemes and as part of the node development.

Based on the above-mentioned assumptions, an estimated total shortage of 2.9 million Housing units under LIG & EWS, which need to be, developed through various government initiatives. The

table below provides the break-up of LIG & EWS housing units in BMEC region, to be addressed through various government initiatives:

Table: Estimated housing demand gap in Economically Weaker Section

States	(in lakh units)	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka	Industrial Nodes	0.03	0.05	0.09	0.14	0.20	0.5
	Rest of BMEC	0.30	0.17	0.21	0.27	0.30	1.2
	Total	*0.34*	*0.22*	*0.30*	*0.40*	*0.50*	*1.8*
Maharashtra	Industrial Nodes	0.05	0.08	0.14	0.23	0.34	0.8
	Rest of BMEC	0.16	0.07	0.11	0.18	0.26	0.8
	Total	*0.20*	*0.15*	*0.25*	*0.42*	*0.60*	*1.6*
BMEC Core		**0.54**	**0.38**	**0.55**	**0.82**	**1.11**	**3.4**

Source: Egis

In economically weaker section category, an estimated 0.34 million housing units has to be developed through various Government initiatives based on the project demand in which 0.13 million has to be addressed as part of industrial Node development in BMEC region. The share of Phase I requirement in the total demand is around 15.9% which accounts for about 54,000 housing units in BMEC region.

Table: Estimated housing demand in Low Income Group category

States	(in lakh units)	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka	Industrial Nodes	0.24	0.40	0.66	1.03	1.53	3.9
	Rest of BMEC	2.30	1.27	1.58	2.03	2.27	9.4
	Total	*2.54*	*1.67*	*2.23*	*3.06*	*3.80*	*13.3*
Maharashtra	Industrial Nodes	0.37	0.63	1.07	1.77	2.57	6.4
	Rest of BMEC	1.18	0.54	0.83	1.38	2.00	5.9
	Total	*1.55*	*1.17*	*1.90*	*3.16*	*4.56*	*12.3*
BMEC Core		**4.08**	**2.84**	**4.13**	**6.22**	**8.36**	**25.6**

Source: Egis

As discussed earlier, a major share of low income group housing requirements, about 27% of the total demand, were to be met through various Government initiatives. An estimated 2.56 million housing units has to be developed in this category through such initiatives. The share of Karnataka and Maharashtra is 1.33 million and 1.23 million respectively.

13.8.3 Preliminary Costing

Construction cost for EWS and LIG were estimated based on benchmarking various housing projects, while MIG and above economic categories were worked out as per Central Public Works Department (CPWD) Rates. Land cost was not accounted in preliminary construction cost estimates.

Table: Preliminary construction cost estimates of Housing demand units in BMEC Region

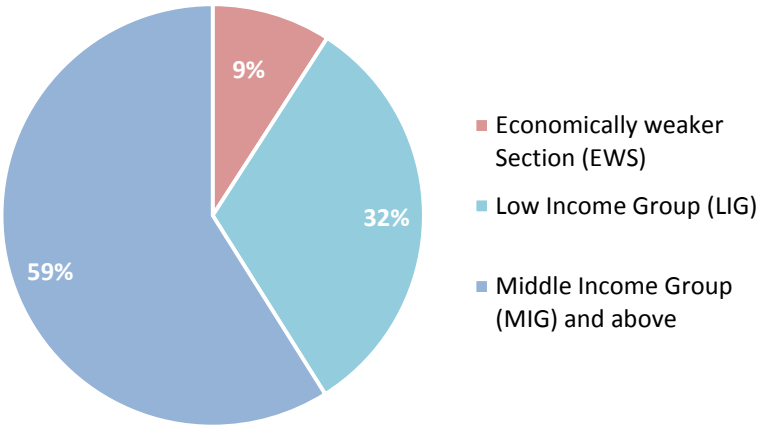
States	(in INR '000 crores)	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka	Industrial Nodes	21	35	57	89	133	335
	Rest of BMEC	200	110	137	177	197	821
	Total	*221*	*145*	*194*	*266*	*330*	*1,157*
Maharashtra	Industrial Nodes	32	54	93	154	223	557
	Rest of BMEC	102	47	72	120	174	516

	Total	*135*	*102*	*165*	*275*	*397*	*1,073*
BMEC Core		**355**	**247**	**359**	**541**	**727**	**2,229**

Source: Egis

Out of the total cost of around INR 2,229,000/- Crores, Karnataka and Maharashtra accounts for INR 1,157,000 crores and 1,073,000 crores in the total cost required for housing infrastructure in BMEC region. The Share of Industrial nodes housing cost in BMEC region is about 40% of the total cost in the sector, which is around **INR 851,000/- Crores**. However, the share of Industrial Nodes housing cost requirements for Maharashtra is about 51.9% of the total cost of the state requirements while in Karnataka it only accounts for 29% of the state's share.

Figure: Share of each economic group in preliminary construction cost estimates



Source: Egis

Detail State wise break-up of preliminary construction cost under each economic category and each phase were described below.

Table: Preliminary cost estimates for Economically Weaker Section Housing

States	(in INR '000 crores)	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka	Industrial Nodes	1.9	3.2	5.2	8.2	12.1	30.6
	Rest of BMEC	18.3	10.1	12.5	16.1	18.0	74.9
	Total	*20.1*	*13.3*	*17.7*	*24.3*	*30.1*	*105.5*
Maharashtra	Industrial Nodes	2.9	5.0	8.5	14.1	20.4	50.8
	Rest of BMEC	9.3	4.3	6.6	11.0	15.8	47.1
	Total	*12.3*	*9.3*	*15.1*	*25.1*	*36.2*	*97.9*
BMEC Core		**32.4**	**22.5**	**32.8**	**49.3**	**66.3**	**203.4**

Source: Egis

Table: Preliminary cost estimates for Low Income category Housing

States	(in INR '000 crores)	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka	Industrial Nodes	6.6	11.2	18.3	28.5	42.5	107.0
	Rest of BMEC	63.9	35.2	43.8	56.4	63.0	262.3
	Total	*70.5*	*46.4*	*62.0*	*84.9*	*105.5*	*369.3*
Maharashtra	Industrial Nodes	10.3	17.4	29.7	49.3	71.3	177.9
	Rest of BMEC	32.7	15.1	23.1	38.4	55.4	164.7
	Total	*43.0*	*32.5*	*52.8*	*87.7*	*126.7*	*342.6*

BMEC Core		**113.4**	**78.9**	**114.8**	**172.7**	**232.2**	**712.0**

Source: Egis

Table: Preliminary cost estimates for Middle Income Group & above Housing

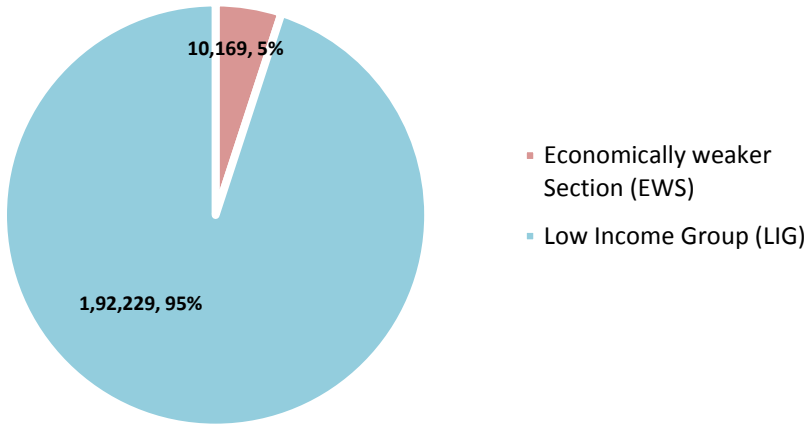
States	(in INR '000 crores)	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka	Industrial Nodes	12.1	20.7	33.7	52.7	78.4	197.6
	Rest of BMEC	118.0	65.0	80.8	104.1	116.3	484.1
	Total	130.1	85.6	114.5	156.8	194.8	681.7
Maharashtra	Industrial Nodes	18.9	32.1	54.8	91.0	131.5	328.4
	Rest of BMEC	60.4	27.9	42.6	71.0	102.3	304.1
	Total	79.3	59.9	97.4	162.0	233.8	632.4
BMEC Core		**209.4**	**145.6**	**211.9**	**318.7**	**428.6**	**1,314.1**

Source: Egis

Preliminary construction cost estimates to address housing demand gap in EWS and LIG

As mentioned above, housing demand gap in EWS and LIG categories addresses the requirement in respective economic categories in addition to the demand of these economic categories housing which will be meet through the mandatory 20-25% FAR reservation for EWS/LIG in all housing projects. Total estimated preliminary construction cost to meet the housing demand gap is about INR 202,398 crores in which the share in EWS and LIG categories is around INR 10,169 crores and INR 192,229 crores respectively.

Figure: Share of EWS and LIG in preliminary construction cost to meet housing demand gap



Source: Egis

Table: Preliminary cost estimates required to meet housing demand gap for EWS

States	(in INR crores)	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka	Industrial Nodes	94	160	261	408	607	1,529
	Rest of BMEC	913	503	625	805	900	3,746
	Total	1,007	663	886	1,213	1,507	5,275
Maharashtra	Industrial Nodes	146	248	424	704	1,018	2,541
	Rest of BMEC	467	216	330	549	792	2,353
	Total	614	464	754	1,253	1,809	4,894
BMEC Core		**1,620**	**1,126**	**1,639**	**2,466**	**3,317**	**10,169**

Source: Egis

Table: Preliminary cost estimates required to meet housing demand gap for LIG

States	(in INR crores)	2017-22	2022-27	2027-32	2032-37	2037-41	Total
Karnataka	Industrial Nodes	1,773	3,023	4,928	7,706	11,472	28,902
	Rest of BMEC	17,256	9,502	11,814	15,226	17,016	70,814
	Total	19,029	12,525	16,743	22,932	28,488	99,717
Maharashtra	Industrial Nodes	2,769	4,695	8,012	13,312	19,242	48,030
	Rest of BMEC	8,828	4,075	6,237	10,379	14,963	44,482
	Total	11,598	8,769	14,249	23,691	34,205	92,512
BMEC Core		**30,626**	**21,294**	**30,992**	**46,624**	**62,693**	**192,229**

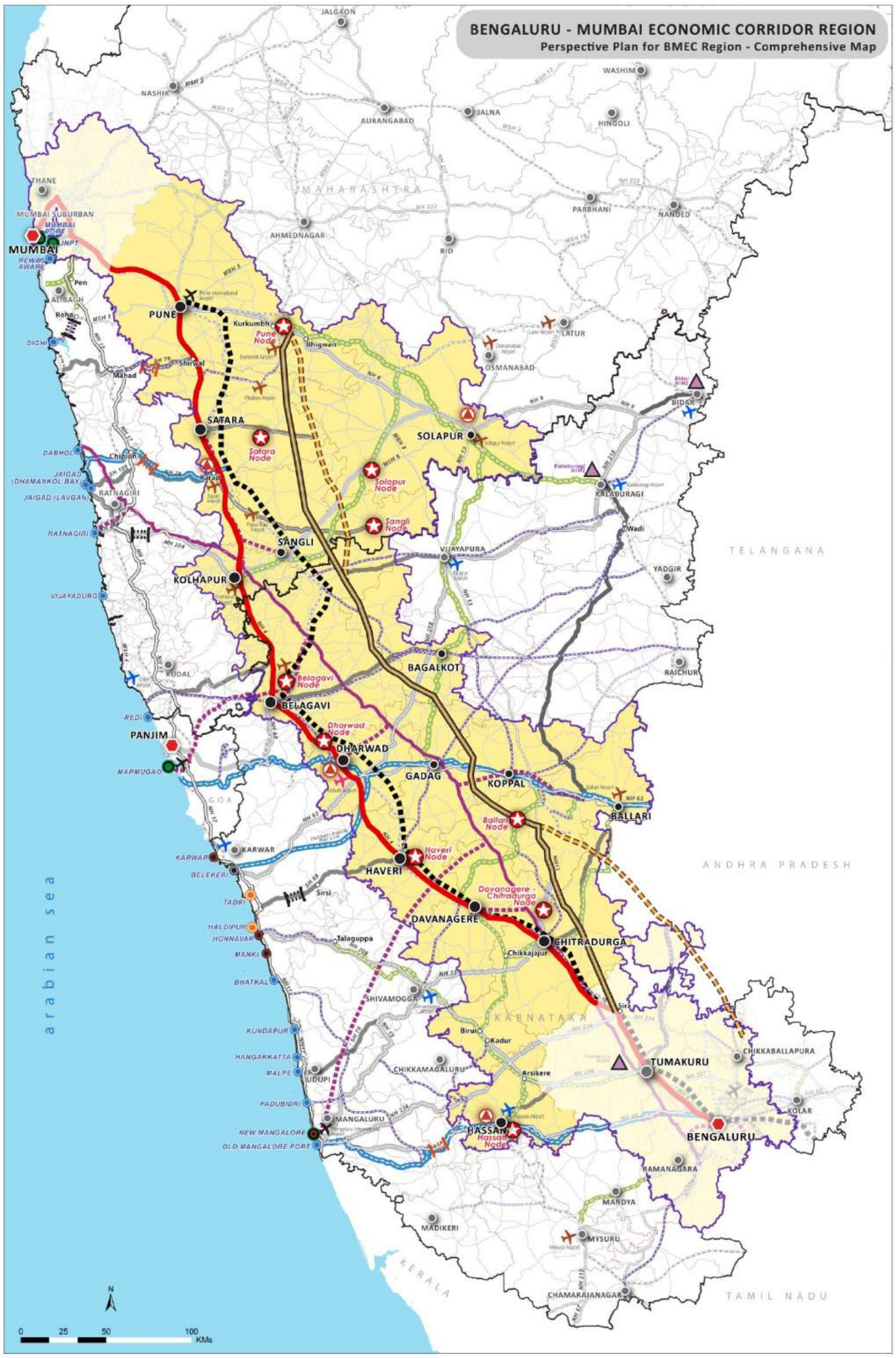
Source: Egis

13.9 Comprehensive Infrastructure Perspective Plan for BMEC Region

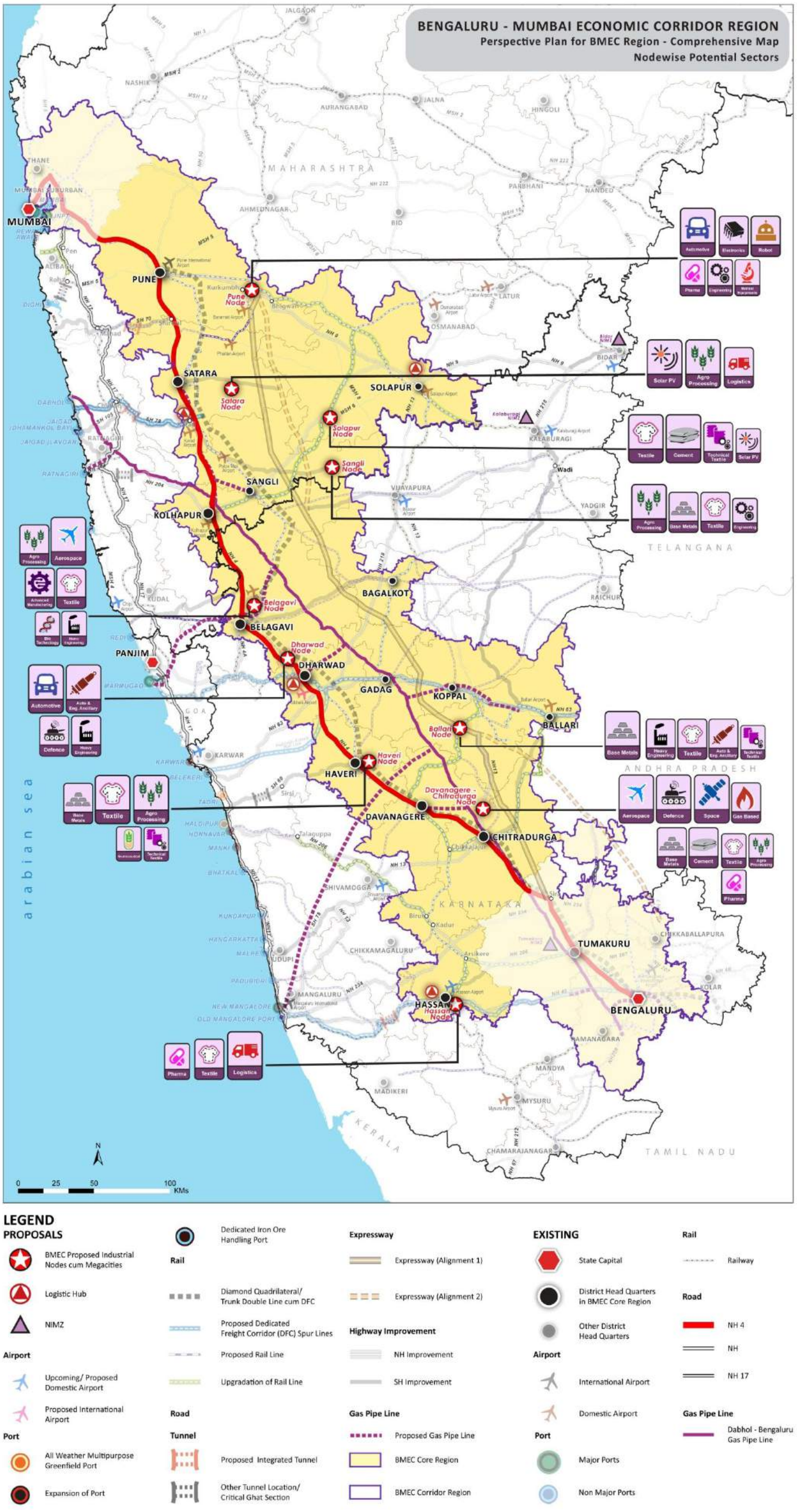
The preceding sections of the chapters formulated this Perspective Plan for BMEC region, covered the process of delineation & defining of the Corridor Region, Identification of location of the Nodes, proposal for various infrastructure facilities including Roads, Railway, Ports, Airports, as well as Power and Water Sectors towards promotion of the overall development of the BMEC Region. All these proposals, along with the existing features of the region were mapped and presented as Comprehensive Map of the Perspective Plan of BMEC Region. This map presented in the following pages indicates the following major proposed components of BMEC Perspective Plan:

- **Corridor Region**
- **Proposed Industrial Nodes cum Mega cities**
- **Proposed Logistic Hubs**
- **Proposed /Upcoming Domestic Airports**
- **Proposed International Airports**
- **Proposed Greenfield all weather multipurpose Ports**
- **Proposed Ports for expansion**
- **Proposed Dedicated Freight Corridor along with Its Spur Lines to the Ports**
- **Proposal for Diamond Quadrilateral Alignment**
- **Proposed New Rail lines and proposed enhancement of existing rail lines**
- **Proposed Integrated Tunnel and Critical Ghat Sections/ Tunnel locations across Western Ghats as part of Port Connectivity**
- **Indicative alignments of Greenfield Expressway proposed between Bengaluru to Pune**
- **Proposed New Road Links, National Highways and State Highway improvements**
- **Proposed Gas pipeline spur lines**

Map Comprehensive Infrastructure Perspective Plan for BMEC



Map Node wise Potential Sectors



14. Identification of suitable locations for Industrial Node cum Mega cities, BMEC Region

Detailed assement of identification of appropriate locations/ sites for the development of Industrial Nodes cum Mega cities is carried out in this chapter. The potential & priority districts for locating the nodes were identified based on various factors including the outcomes of Location Suitability Assessment, DIPP's/DMIDC's recommendations, suggestions and recommendations from respective State Governments etc.

Subsequent to identification of the potential & priority districts, the possible locations for nodes within these districts were identified through further assessment of various factors, including availability & cost of land, water, connectivity, predominance of waste land or non- agriculture/ single crop lands. However, ease of mobilising or availability of government land was the prime determining factor in case of Karnataka and in case of Mahasrashtra, as there were no large government land parcels (neither notified nor acquired) available for development, comparision between cost of land VS cost of providing water, between locatsion in proximity of site to NH 4 and away from NH4, was the prime determining factor. . Details of this process are described in the subsequent sections of this chapter.

14.1 Node Locations: Karnataka

As explained in the previous chapter, per the proceeding of the project review meeting held on 29.10.2014 under the chairmanship of ACS, C&I, GoK, it was decided that out of the six districts identified within the BMEC region of Karnataka to locate potential nodes, development of 3 nodes were prioritised, the locations of which were to be finalised based on availability of contiguous Government land (>3000 acres of Govt. Land) within the 4 districts of Dharwad, Belagavi, Chitradurga and Haveri/Davanagere.

Further, KIADB was requested to explore the availability of Govt. land within the above-mentioned four districts, and DIC, GoK was authorized to finalize the locations of three priority nodes as per inputs on land availability provided by KIADB and assessments of these locations by consultant. Given below is the list of four core districts & its sub-districts shortlisted by GoK, which will be assessed to locate three priority nodes.

Table: List of core districts shortlisted by Government of Karnataka to locate Priority Nodes.

Sl no:	List of Core districts identified and prioritised by GoK for locating nodes	Potential Target sub districts
1	Belagavi	Chikkodi, Hukkeri , Belagavi, Parasgad , Ramdurg, Sampgaon
2	Dharwad	Hubballi, Dharwad, Khalghati
3	Chitradurga	Challakere, Hiriyur, Holakere, Chitradurga
4	Haveri/ Davanagere	Haveri, Rannibennur, Byadgi, Savanur/

Channagiri, Harapanahalli, Jagalur

Source: Proceeding of the Project Review Meeting held on 29.10.2014 under the chairmanship of ACS, C&I, GoK. and Egis Location Suitability Assessment.

14.1.1 Industrial land demand & Node Size-Karnataka

The industrial land demand for the identified core districts and nodes are as follows

Table: Phase Wise Industrial Land Area Requirement (in sq km) for identified Priority Districts and Nodes

Districts	2017		2022		2027		2032		2037		2041	
	Dst. IA	Node IA *	Dst. IA	Node IA *	Dst. IA	Node IA *	Dst. IA	Node IA *	Dst. IA	Node IA *	Dst. IA	Node IA *
Belagavi	0.67	0.54	6.09	4.87	16.16	12.93	33.50	26.80	62.65	50.12	98.96	79.17
Dharwad	0.31	0.24	2.64	2.11	7.22	5.78	14.99	11.99	28.02	22.42	44.36	35.48
Chitradurga	0.14	0.11	1.47	1.18	3.98	3.19	8.21	6.57	15.42	12.34	24.33	19.47
Davanagere	0.13	0.10	1.38	1.11	3.69	2.95	7.62	6.10	14.41	11.53	22.78	18.23
Haveri	0.01	0.01	0.58	0.46	1.79	1.44	3.99	3.19	7.67	6.14	15.52	12.41

**80 % of District Industrial Area is considered as Node's Industrial Area*

Ideal Node Size

Based on the National Manufacturing Policy guideline, it is assumed that an ideal Industrial Node cum Mega city shall have its 30% of its area as processing zone and balance would be the non-processing zone which will cater to the social infrastructure requirements and support amenities required for the Industrial Development. The following table presents the land required for development of Nodes in such scenario.

Table: Ideal Node Size (in sq km) for Nodes in Priority Districts, Phase 1

Nodes *(all units in Sqkm)*	2017	2022	2027	2032	2037	2041
Belagavi	1.79	16.23	43.10	89.33	167.07	263.90
Dharwad	0.81	7.04	19.25	39.98	74.73	118.28
Chitradurga	0.38	3.93	10.62	21.89	41.13	64.89
Davanagere	0.34	3.69	9.84	20.33	38.43	60.75
Haveri	0.03	1.54	4.78	10.63	20.46	41.38

** Ideal node size indicates 70: 30 proportion for non processing and processing areas;*

Recommended Node Size

With no large contiguous land readily available with the government and due to various limitations in mobilising large parcels of land and considering the fact that the projected industrial development directly depends on development of the Industrial development through Govt's initiative, it was decided to assume a larger share of land for Processing Zone. Also considering the fact that development of majority of the non-processing components can happen through direct private sector initiatives, the share of Processing Zone was assumed to be around 60%. i.e. 60% of the Node area can be utilized for Industrial use. Final phase wise land requirements for each node in Karnataka are presented in table below. However, land available at each identified location determines proposed horizon period and size of the node. Based on the parameters discussed above, horizon

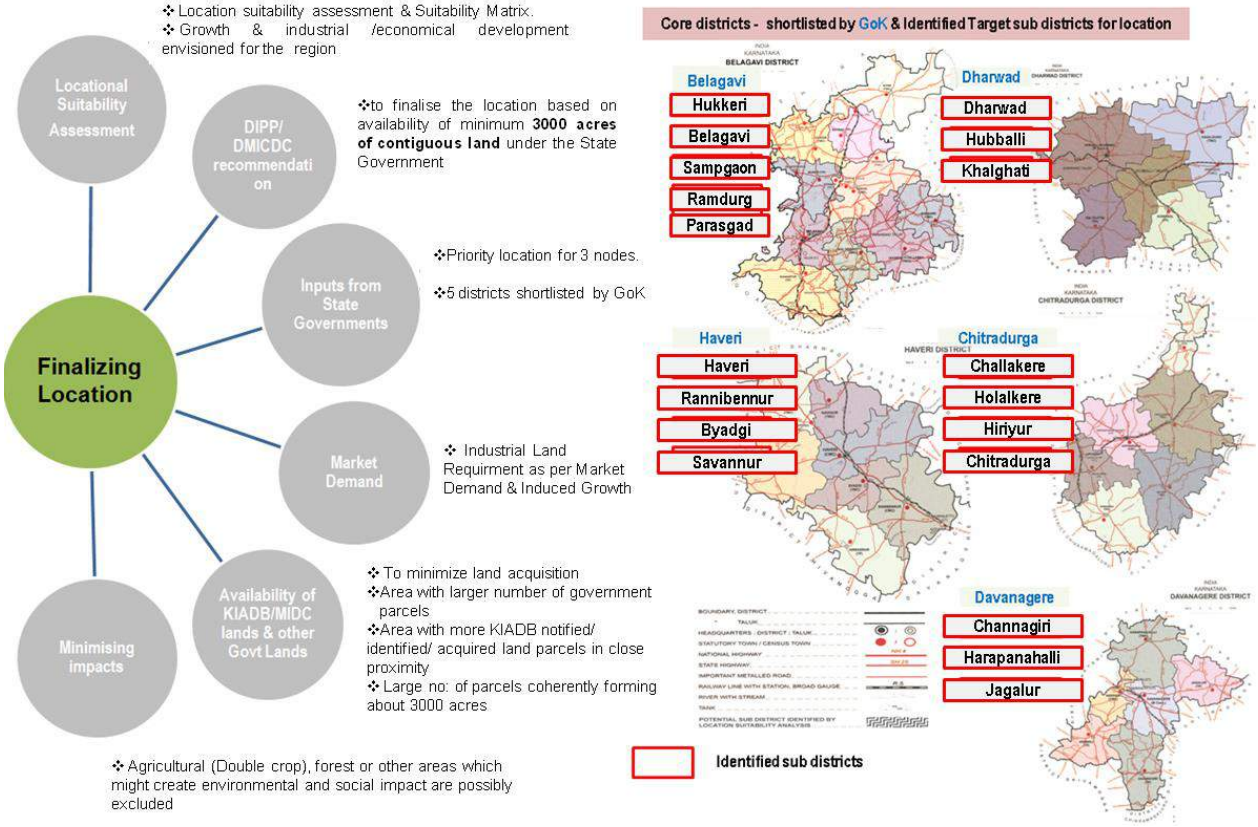
period proposed for Belagavi, Dharwad, Chitradurga, Davanagere and Haveri are 2032, 2032, 2037, 2037 and 2041 respectively.

Table: Recommended Node Size (in sq km) for Nodes in Priority Districts

Nodes *(all units in Sqkm)*	2017	2022	2027	2032	2037	2041
Belagavi	0.89	8.12	21.55	44.67	83.54	131.95
Dharwad	0.41	3.52	9.63	19.99	37.36	59.14
Chitradurga	0.19	1.96	5.31	10.94	20.56	32.44
Davanagere	0.17	1.84	4.92	10.17	19.22	30.38
Haveri	0.01	0.77	2.39	5.32	10.23	20.69

14.1.2 Criteria and Methodology for short listing & finalising node locations

Figure: Factors leading to Identification of Node locations



Factors considered to assess the location already shortlisted through location suitability assessment & shortlisted by GoK, to identify & finalise an appropriate locations for development of Node cum Mega within Karnataka part of BMEC region are as follows:

- **Maximizing utilization of land parcels under Government ownership to minimize need for land acquisitions.**
- **Locations with maximum extent of land parcels, which are notified or identified for the acquisition process under KIADB is considered.**

- **Identifying locations which have large clusters of government land holdings of 100 acres & above, coherently around or in proximity to KIADB's notified lands**
- **Agricultural (Double crop), forest or other areas which might create environmental and social impact are possibly excluded.**
- **Proximity to water sources which can meet the water demands of the industrial node.**

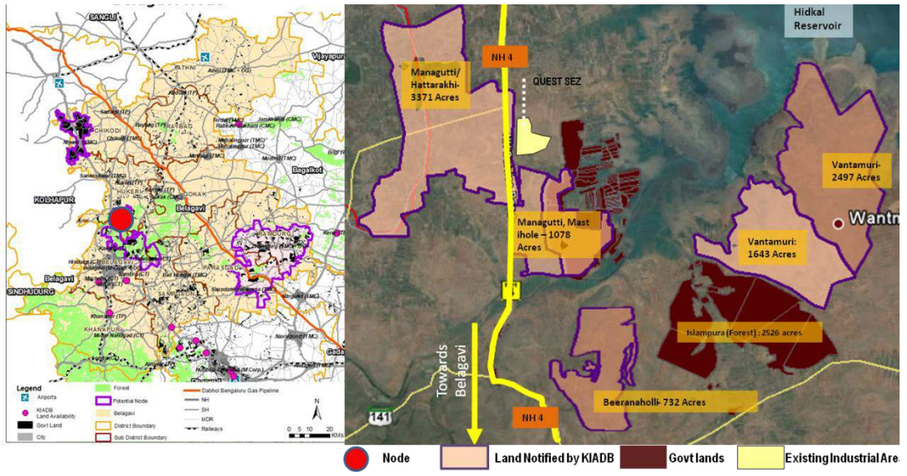
Based on the above-mentioned criteria, the following four shortlisted core districts and its sub districts would be assessed to identify appropriate site locatsions for node developemnt & the same is elaborated in the following part of the section

- **Belagavi**
- **Dharwad**
- **Chitradurga and**
- **Haveri/ Davanagere**

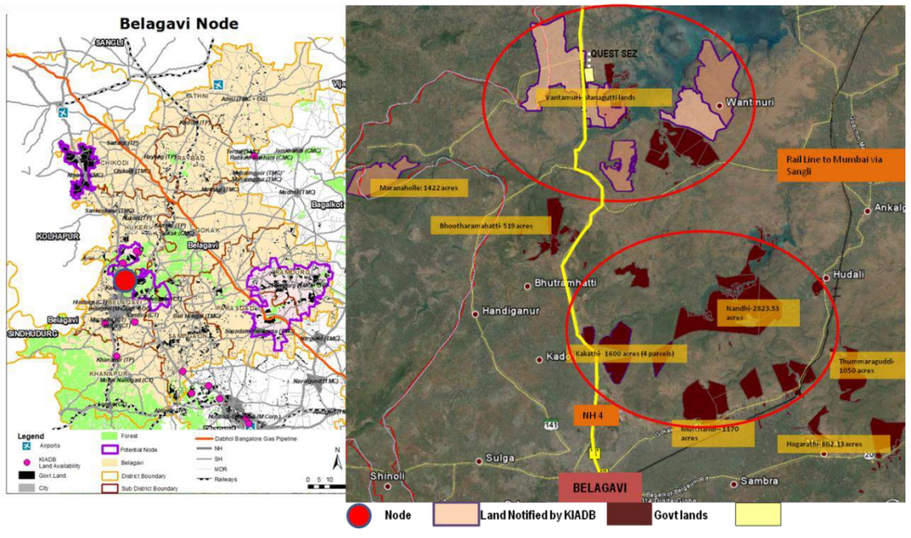
Table: Identification of Node Locations: Karnataka

Possible Node Locations within Target Sub districts		Parameters considered to identify appropriate site locations within Target Sub Districts	Assessment of Site Options for Node within identified Target Sub-Districts
Sub Districts	**Village / Location names**		
Identification of Node Locations- BELAGAVI DISTRICT			
Chikodi	Adi-Nipani-Gondhikoppa (total around 25 villages)	**Chikodi:** • More than 50% of its area under agriculture, with double crops. • Identified government parcels within Chikodi in Adi-Nippani- Gondhikoppa region are predominantly irrigated agriculture land parcels • **Chikoddi area is excluded from the further analysis for locating Industrial Node.**	**SITE OPTION 1: Vantamuri- Managutti** **MERITS** • **Land Availability: Land notified/ acquired by KIADB : 41410 acres, Government land holdings above 100 acres: 2596.4 acres** • Good Rail, Road Connectivity • Proximity to Hidkal Reservoir • Proximity to QUEST SEZ will provide impetus to industrial node development • Vantamuri Land has more than 4000 acres of contiguous land with good connectivity **DEMERITS** • Proximity to Reservoir may have environmental concerns • Since the parcels are only in the preliminary notification stage, the acquisition of these parcels might take anytime between 1-1.5 years. • Shortage of fund might also prolong the process. **SITE OPTION 2: Nandhi- Kakathi- Muchandi** **MERITS** • **Land availability of more than 5000 acres (Nandi and Kakathi).** • Large parcel in Nandhi (2800 acres) (which closer to the required minimum 3000 acres) • Parcels already under govt. ownership possibility of mobilising these lands for development will be faster • Excellent road and rail connectivity • Nandhi Land closer to Shirur reservoir • Location of wind mills in the land parcels • Major share of land parcels under non agricultural uses, therefore suitable for development **DEMERITS** • Land parcels are spread apart a minimum distance of 1-3 km • Many of these parcels might fall under the category of forest, hence it may not be available for development • Proximity to Reservoir may have environmental concerns
Hukkeri, Belagavi, Sampagaon	Vantamuri, Beeranaholli, Kakathi, Nandi (covering more than 32 villages)	**Hukeri, Belagavi, Sampagaon** • Based on suitability, stake holder interactions and subjective analysis the node locations identified within, **these sub districts are considered for further analysis**	
Ramdurg, Parasgad	Mudhakavi -Hooli	**Ramdurg- Prasagad:** • Government land holdings available in these areas are not available as a cluster or in close proximity and are widely scattered, hence, • **This possible location for node is also excluded from the further analysis.**	

Map : Vantamuri Managutti



Map: Nandhi- Kakathi-Muchandi



RECOMMENDATION: Considering the above-mentioned factors and considering that Option1 has large parcels of contiguous land area, which are also already notified, the site option at Vantamuri- Mastihole – Managutti is recommended for locating the Node cum mega city at Belagavi

Possible Node Locations within Target Sub districts		Parameters considered to identify appropriate site locations within Target Sub Districts	Assessment of Site Options for Node within identified Target Sub-Districts
Sub Districts	Village / Location names		

Identification of Node Locations- DHARWAD DISTRICT

Dharwad district: Dharwad **Belagavi district**: Sampagaon

Belur- Durgadakeri- Kittur area

Based on extent of land under government ownership or notified by KIADB suitability, stake holder interactions and subjective analysis, Dharwad sub district is identified as the predominant target sub district within Dharwad district for locating the node, and bordering Sampagaon sub district of Belagavi district are considered for further analysis for the determining the suitable locations of the nodes.

SITE OPTION 1: Kittur-Dombarkuppa- Durgadakeri (Dharwad- Belagavi District Border)

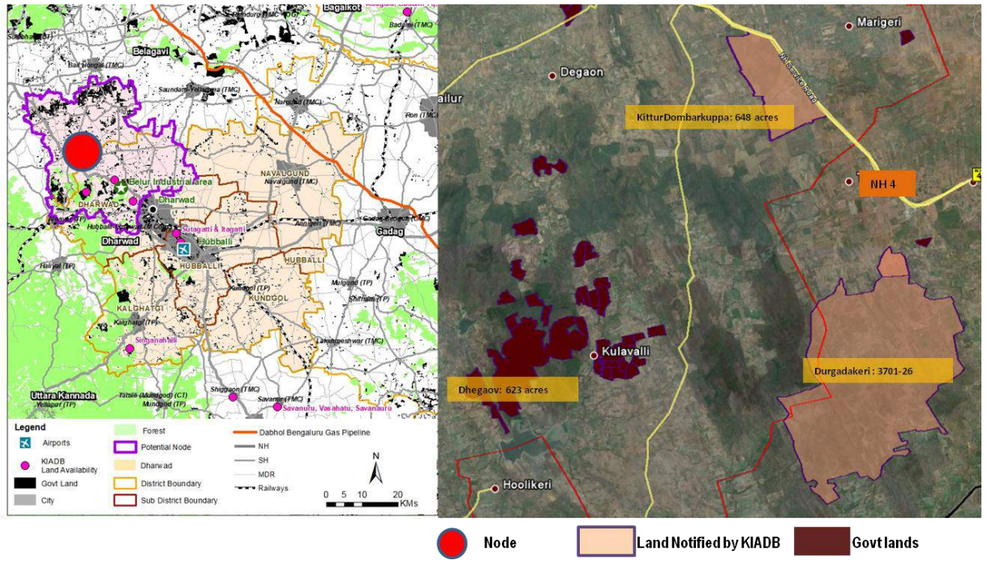
MERITS

- **Land Availability: Land notified/ acquired by KIADB-4349.4, Government land holdings above 100 acres- 784.65**
- Dugadakeri parcel alone is around 3701 acres
- Excellent road and rail connectivity
- Proposed Automobile Vendor Park, Proximity to Hubballi – Dharwad twin city and Belagavi
- Proxmity to Renuka sagar Reservoir

DEMERITS

- Durgadakeri and Kittur Dombarkuppa parcels is 4.5 km apart
- Largest parcel Durgadakeri is only in the preliminary notification stage
- Shortage of fund might also prolong the process of land acquisition
- Durgadekeri parcel are Desai lands under the Tribunal.

Map: Kittur- Dombarkuppa- Durgadakeri



SITE OPTION 2: Mammigatti-Kelegeri- Singanahalli

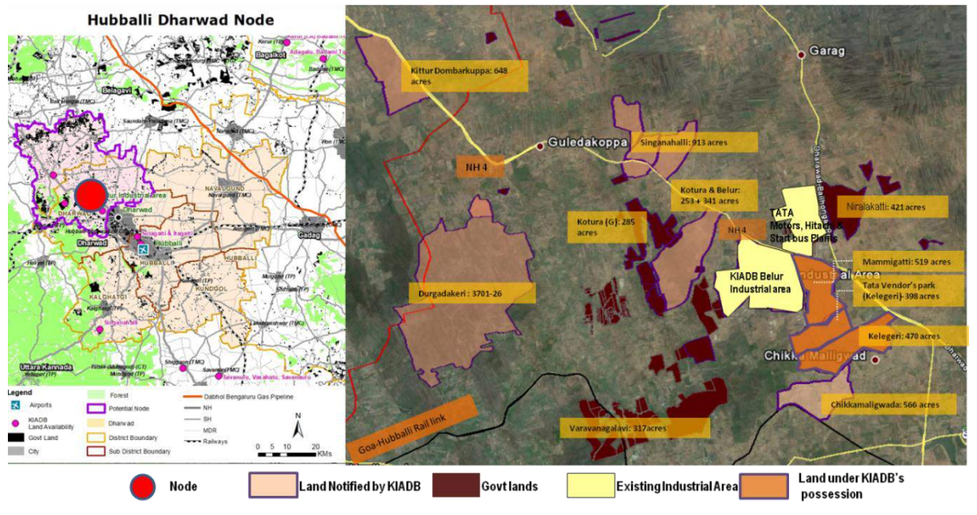
MERITS

- **Land Availability: Land notified/ acquired by KIADB-7163.45, Government land holdings above 100 acres- 927.25**
- More than 4300 acres (in close proximity as one cluster), with around 3462 acres as already notified by KIADB
- 1387 acres of land which is already available with KIADB
- Existing KIADB industrial areas & TATA Motors- Hitachi – Marcopolo facilities
- Excellent road and rail connectivity
- Proposed Automobile Vendor Park
- Proximity to Hubballi – Dharwad twin city

DEMERITS

- Parcels are only in the preliminary notification stage
- Shortage of fund
- KIADB Area, are partly allotted or is considered for allotment

Map: Mammigatti- Kelegeri-Singanahalli



RECOMMENDATION: Considering the above-mentioned fact and as per the inputs from DIC, it is recommended to consider the Site Option 1, which is Kittur- Dombarkuppa-Durgadekeri, parcels for development of node cum mega city at Dharwad.

Possible Node Locations within Target Sub districts		Parameters considered to identify appropriate site locations within Target Sub Districts	Assessment of Site Options for Node within identified Target Sub-Districts
Sub Districts	**Village / Location names**		

Identification of Node Locations- CHITRADURGA AND DAVANAGERE DISTRICTS

Challakere (CHITRADURGA)	• Ullarthi Kaval • Rekhalagere Amani Kavalu • Channamma Nagathihalli Kavalu • Hirekavalu • Kudhapura (total around 34 villages)	In Chitradurga district, based on the extent of land under government ownership or notified by KIADB under each sub districts, Chalakkere, Holalkere and Hiriyur were identified as the predominant target sub districts. However other factors like predominance of waste lands and single crop, lower land process etc. favours Chitradurga taluk as well.
Holalkere (CHITRADURGA)	• Gunderi Kaval • Kaduru Kavalu • Rangaiahanadurgada Kavalu (total around 23 villages)	
Hiriyur (CHITRADURGA)	• Yalladakere • Pillali, Lakkenehalli • Uttare- Kattehole	
Chithradurga (CHITRADURGA)	• Chikkagondanahalli	

<u>SITE OPTION 1: Chikkagondanahalli- Sangenahalli- Donnehalli (Chitradurga- Davanagere District Border)</u>

MERITS

- Excellent Road Connectivity
- Site is located bordering Davanagere and Chitradurga districts.
- Area is relatively under developed and industrial development is expected to promote economy and provide employment.
- Proximity to Dhabol- Bengaluru Gas pipeline
- Both the districts are major educational hubs of the State.
- Strong agro-base can facilitate establishment of Neutraceuticals industry
- Land prices are relatively lower
- Presence of Wind farms

DEMERITS

- Availability of water is a major challenge.
- Location of nearest rail link at a distance of around 20 to 28 km.
- No large government land parcels and no KIADB's notified land
- There might be resistance from the landowners and they might not be ready to sell the lands.

<u>SITE OPTION 2: Challakere</u>

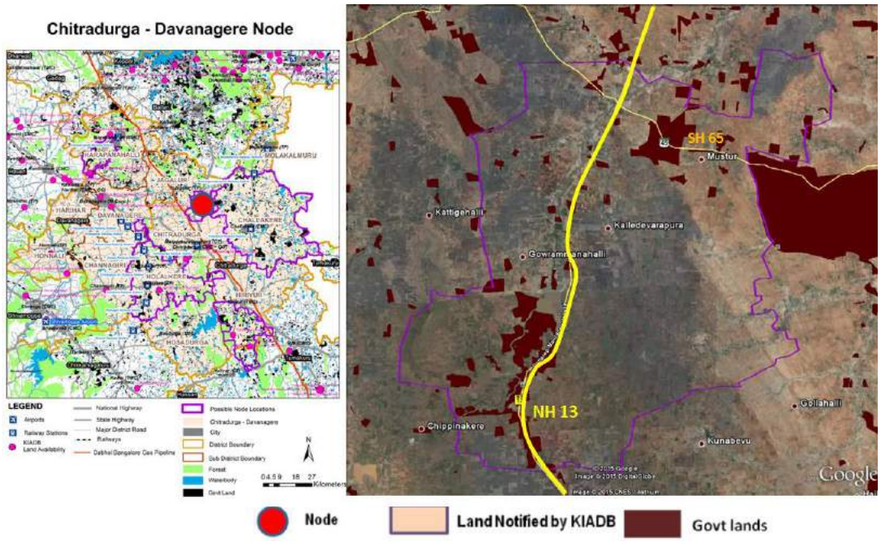
MERITS

- **Land Availability: Land notified/ acquired by KIADB-500, Government land holdings above 100 acres- 14692**
- Large parcels of government land holdings
- Proposed development of DRDO, ISRO, BARC & IISC, with an area of more than 10,000 acres in c lose proximity to Challakere
- Proposed Greenfield Expressway alignment is also aligned to connect Challakere
- Known as OIL CITY, 60+ oil industries in Challakere.
- Majority of these land parcels are non agriculture suitable for industrial development.

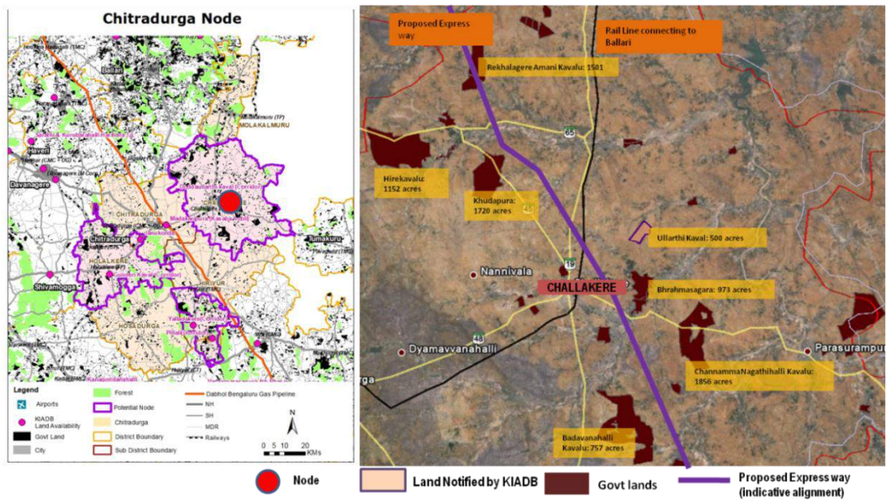
DEMERITS

- Most of these land parcels might be categorised as Grazing Grounds of the villages.
- All the parcels are around 5 to 10 km apart

Map : Chikkagondanahalli- Sangenahalli- Donnehalli



Map: Challakere



Harapanahalli (Predominant) and Harihara (as it falls in boarder of Harihara) (DAVANAGERE)	Ananthanahalli-Sarathi-Kurubarahalli	In Davanagere district, based on parameters like non-irrigated single crop areas, waste land/ karab lands, fallow lands, relatively lower land price, accessibility to NH, Gas pipeline etc, Jagalur Taluk is an ideal location for the node. The land also lies bordering both Davanagere-Chithradurga districts which is an added advantage, since it shall facilitate the development of both the districts.
Jagalur (DAVANAGERE)	Sangenahalli- Donnehalli	
Davanagere (DAVANAGERE)	Hebbalu	

- Availability of water is a major issue of Chitradurga district
- Shortage of fund

SITE OPTION 3: Holalkere

MERITS

- **Land Availability: Land notified/ acquired by KIADB-600, Government land holdings above 100 acres- 12972**
- Large parcels of government land holdings (more than 2000 acres as contiguous land parcel)
- Proximity to some of the iron ore & limestone mines and Industries in the region
- Proximity to existing Bengaluru- Chitradurga rail link via Chikjjajur

DEMERITS

- Most of these land parcels might be categorised as Grazing Grounds of the villages
- All the parcels are around 5 to 15 km apart
- Availability of water is a major issue

SITE OPTION 4: Hiriyur

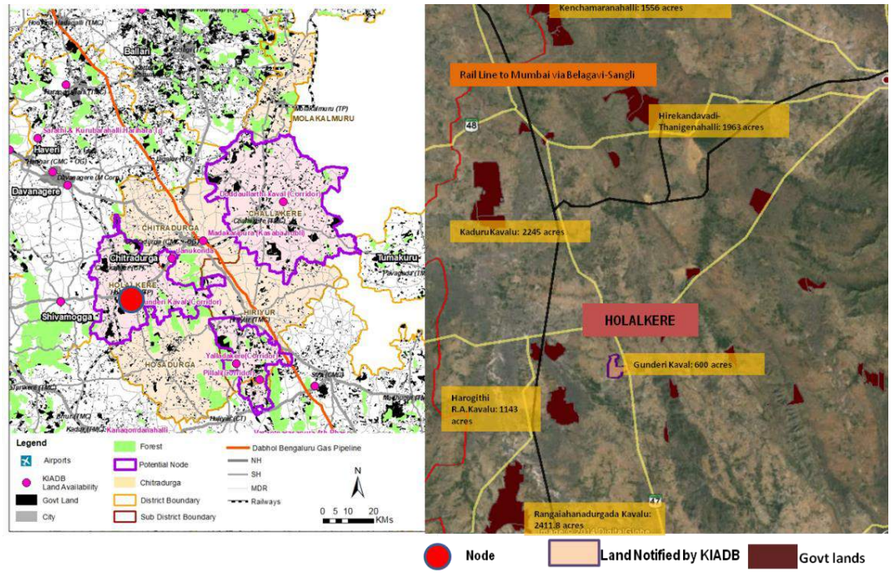
MERITS

- **Land Availability: Land notified/ acquired by KIADB-1071, Government land holdings above 100 acres- 8459**
- Contiguous land parcel of more than 4000 acres is available in Uttare-Kattehole
- Proximity to some of the iron ore & limestone mines and Industries in the region
- Located in close proximity to NH4

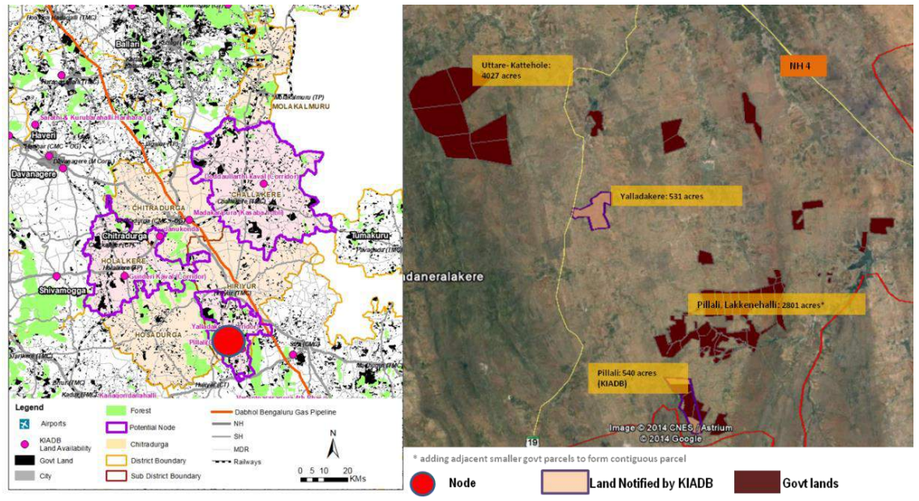
DEMERITS

- All the parcels are around 5 to 15 km apart
- Many of these parcels might fall under the category of forest, hence it may not be available for development
- Most of these land parcels might be categorised as Grazing Grounds of the villages

Map : Holalkere



Map: Hiriyur



SITE OPTION 5: Harapanahalli- Ananthanahalli- Narayanpura

MERITS

- **Land Availability: Land notified/ acquired by KIADB-200**
- Harpanahalli Sub district is one of the less developed districts of Davangere
- Proximity to Dhabol- Bengaluru Gas pipeline
- Strong agro-base
- Possibility to have direct rail connectivity
- Land prices are relatively lower
- Presence of Wind farms

DEMERITS

- Absence of large govt. Land holdings

SITE OPTION 6: Harihara- Sarathi- Kurubarahalli

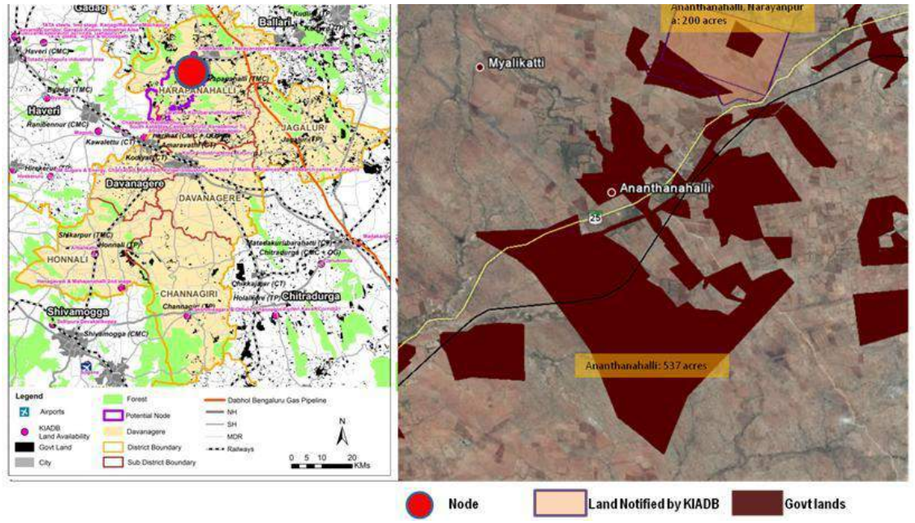
MERITS

- **Land Availability: Land notified/ acquired by KIADB-276**
- Possibility of availability of large Govt. Land parcels in this area
- Location in between SH25 and NH4
- Existing Industrial development in Harihar
- Proximity to Tunga river
- Strong agro-base
- Presence of wind farms

DEMERITS

- Lack of clarity on the availability of govt. Land parcels
- Area is relatively fertile area

Map : Harapanahali- Ananthanahalli- Narayanpura



Map: Harihara- Sarathi- Kurubarahalli

SITE OPTION 7: Hebbalu

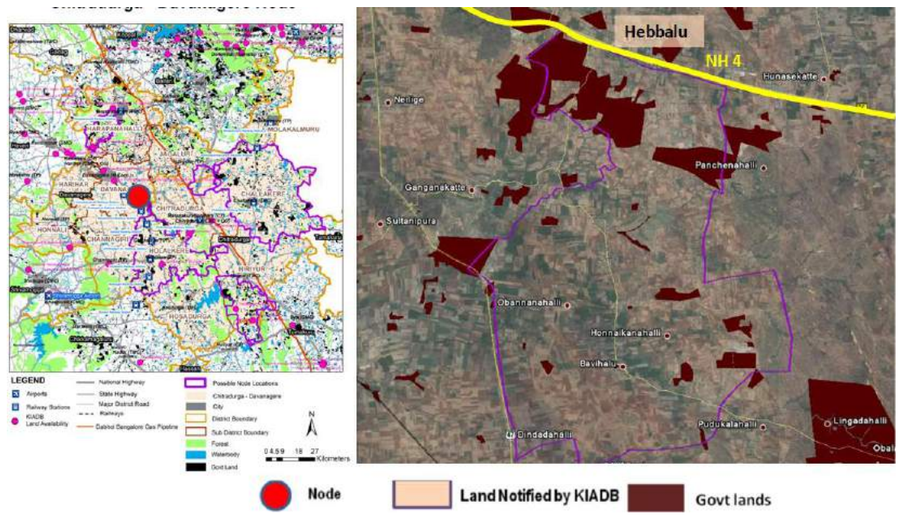
MERITS

- **Land Availability: Govt Land : 200 acres**
- Proximity to NH4
- Possibility of having direct rail connectivity through the on-going Tumakuru- Davanagere direct rail link
- Located just 20 kms south of Davanagere city and only around 40kms from Chitradurga city
- Presence of wind farms

DEMERITS

- nearest water source is around 65 to 90 kms
- the land cost is relatively higher.
- 27 to 30 kms away from the existing Gas pipeline
- Except the 200 acres of government land, there is no other large government land parcels available or there is no KIADB's notified land areas

Map: Hebbalu



RECOMMENDATION: Chikanagondanahalli- Sangenahalli which is about 18 km north of Chitradurga town and about 12-13 km from Kudhapura can be considered. This location can reap the benefit of the ISRO, BARC and other government establishments. Proximity to Dhabol- Bengaluru Gas pipeline will be an added advantage and there is already a proposal to have Gas based power plant in close proximity to this area.

Possible Node Locations within Target Sub districts		Parameters considered to identify appropriate site locations within Target Sub Districts	Assessment of Site Options for Node within identified Target Sub-Districts
Sub Districts	**Village / Location names**		

Identification of Node Locations- HAVERI DISTRICT

Haveri	Agadi- Boodagatti-Karjagi-Ramapura	Based on the extent of land under government or notified by KIADB under each sub districts, suitability, stakeholder interactions and subjective analysis, Haveri sub-district is identified as the predominant target sub district within Haveri district and is considered for further analysis for the determining the suitable locations of the nodes	

SITE OPTION 1: Agadi- Boodagatti

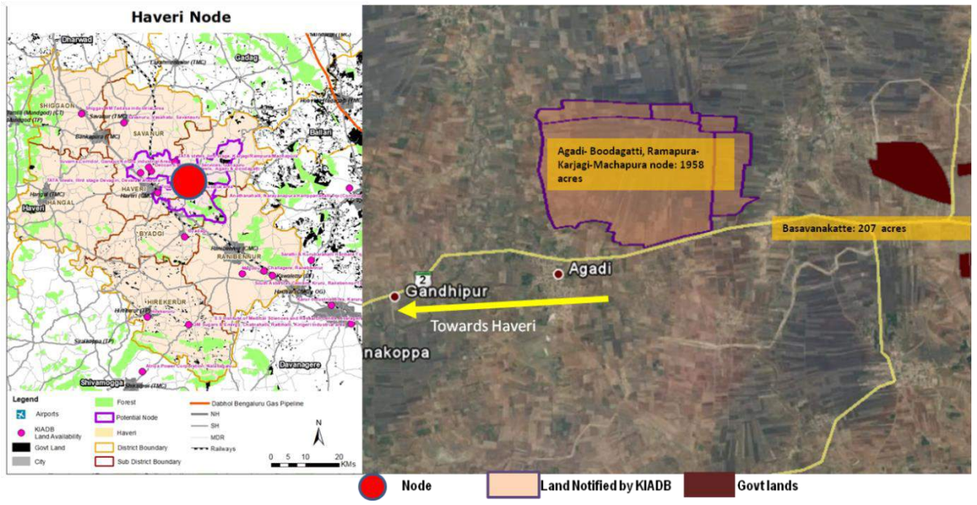
MERITS

- **Land Availability: Land notified/ acquired by KIADB : 1958 acres, Government land holdings above 100 acres: 207 acres**
- The proposed TATA Steel plant would become the anchor industrial development of the area, promoting other industrial activities
- Almost close to 2000 acres of land which are in the process of final notification and acceptance of industrial development in the area by the locals
- area has a strong agro base
- Proximity to Hubballi & Ballari region, proximity to NH4 and rail connectivity
- Majority of these land parcels are single crop agriculture lands

DEMERITS

- there is need for more land to be acquired around the existing notified parcel
- As more than 3000 acres of land is to be identified, notified and then acquired, the acquisition of these parcels might take anytime between 1 to 1.5 years.
- Government need funds for acquiring such large land parcels. Shortage of fund might also prolong the process

Map: Agadi- Boodigatti



RECOMMENDATION: Since only one option i.e Agadi- Boodagatti is considered for the node in Haveri district, this is the possible option for locating the industrial node cum mega city. The location has its own advantages such as the proposed TATA Steel plant becoming the anchor industrial development of the area, promoting other industrial activities, thus facilitating the establishment of industrial node in this location. Other locational features also suggest that the location can be considered for the location of the industrial node cum mega city.

14.1.3 Priority Node cum Mega cities of Karnataka- Finalised site locations

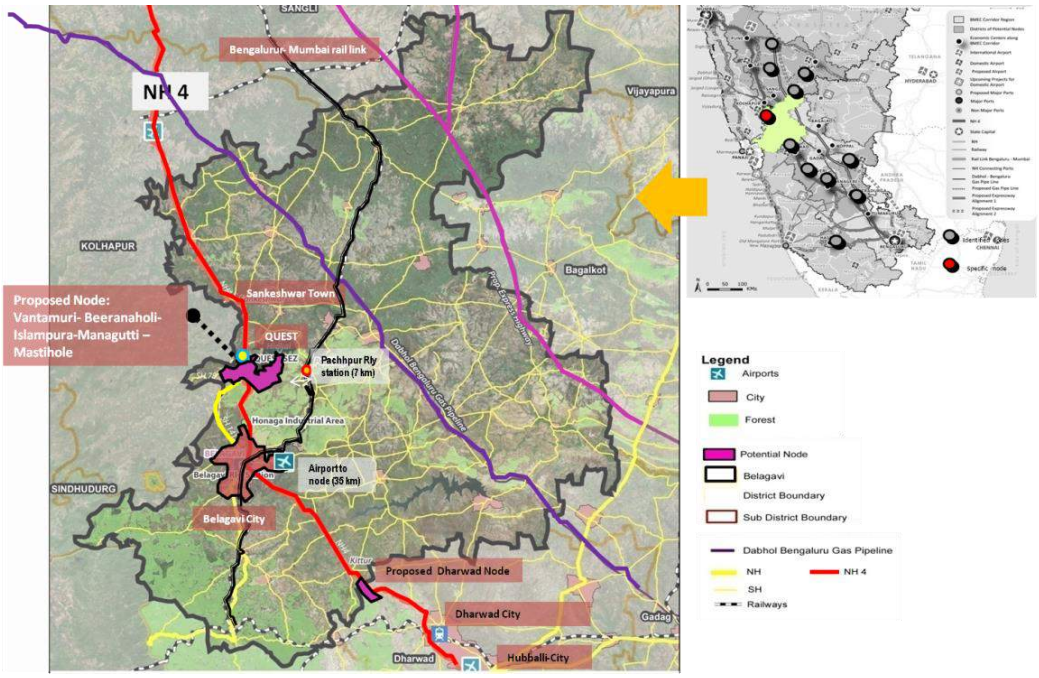
Based on the above analysis including the detailed assessment of actual extent of land available with government,notified land parcels by KIADB, based on verification by Bhoomi, GoK and through verification by joint site visits of identified site options and above-mentioned recommendations, a report on finalisation of site locations at Dharwad, Belagavi & Chitradurga- Davanagere districts was submitted in January 2015, to KSIIDC & Department of I&C, GoK, for its review and finalisation. Through a series of interactions with KIADB, Department of C&I&KSIIDC, GoK decided to finalise three site locations for the three priority nodes of Karnataka. The same was presented and finalised in the meeting held on 5th February 2015, under the chairmanship of Chief Secretary, GoK and in the presence of ACS, C&I, ACS to CM, Secretary,& Addl. Secretary, DIPP , GoI, the following are the three site locations finalised for locating the three priority node cum mega cities in Karnataka:

1. **Belagavi Node: Vantamuri-Mastihole- Managutti in Belagavi**
2. **Dharwad Node: Kittur-Dombarkuppa- Durgadakeri in Dharwad (Belagavi- Dharwad Border)**
3. **Chitradurga- Davanagere Node: Chikkagondanahalli- Sangenahalli-Donnehalli in Chitradurga (Chitradurga- Davanagere Border)**

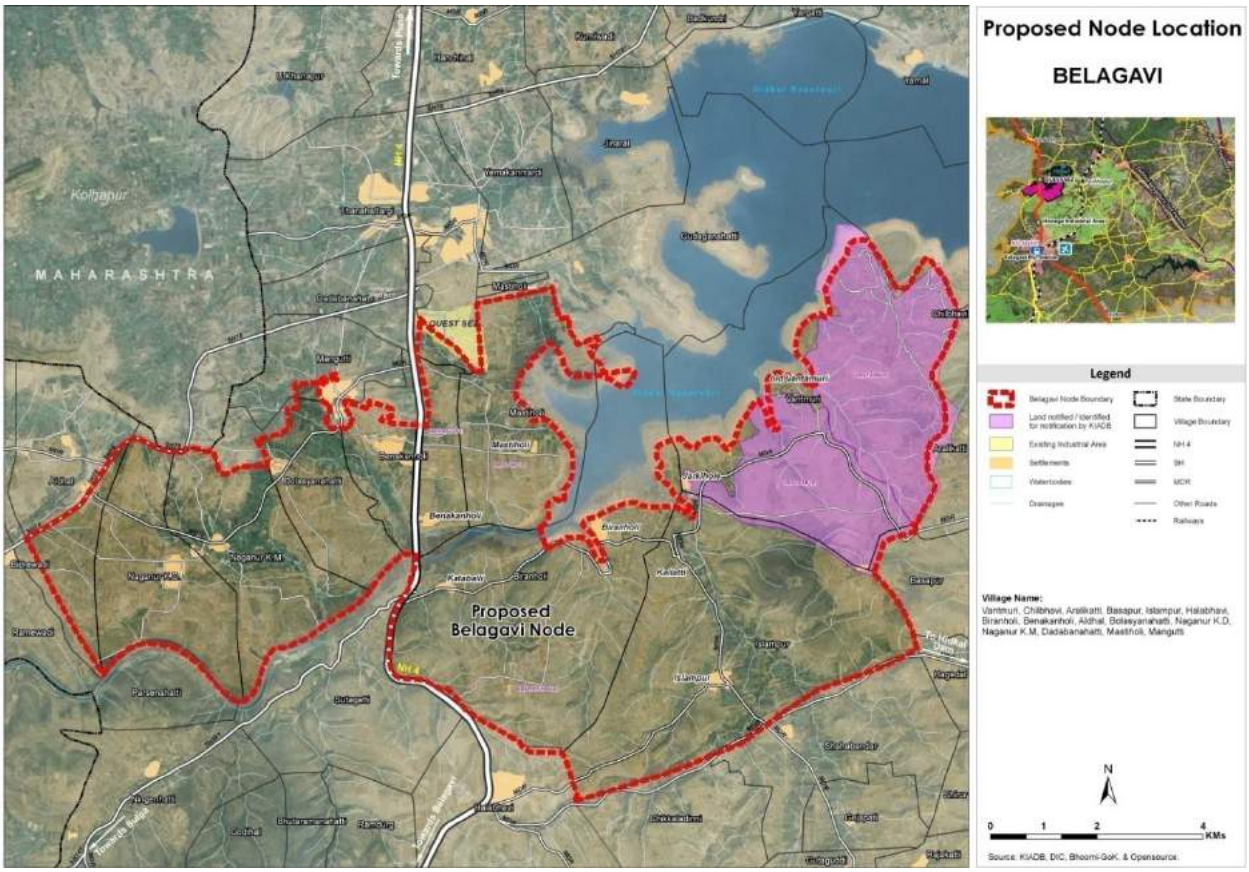
Belagavi Node

Based on the above analysis, the Vantamuri-Mastiholi-Managutti, located in Hukeri sub-district (taluk) of Belagavi is identified for development of BMEC Node. The following maps indicates the location of the identified node location with reference to BMEC Region & Belagavi City and the subsequent map showing the possible extent of identified, Vantamuri-Mastiholi-Managutti node site in Belagavi district.

Map: Location of Belagavi Node at Vantamuri- Mastiholi- Managutti



Map: Possible Extent of identified node



Location

The identified site is located on NH4, around 25 km north of Belagavi city. The nearest approach point of the proposed node to Belagavi city will be around 24 kms. The proposed nodes falls within Hukeri sub districts of Belagavi. As can be seen in the map above, the proposed nodes cover the cluster of the identified/notified land parcels by KIADB. The identified Node is located on either side of the NH4, physically separated by the back water of Hidkal Reservoir. The cluster is in close proximity to the QUEST SEZ which is an aerospace precision engineering & manufacturing zone, which is among the first of its kind in India, spread across about 300 acres and has plans & potential to expand upto 600 acres.

Connectivity & linkages

Road: The parcels have excellent connectivity in terms of road linkages, as the parcels lie on **NH4**. Apart from NH4 the site can also be approached from Belagavi City through **SH 141** which joins the **NH4** at Sutagati, which is just 1.3 km away from the nearest approach point to the site (Beeranahole land parcel). As explained above the proposed node location comprises of number of independent land parcels which are connected to NH4 through SHs, MDRs & village roads. The same is explained elloborately in the trailing part of this report.

Rail: The nearest railway line from the cluster is the major rail link from Bengaluru to Mumbai passing via Gokak, Miraj, and Sangli and the nearest railway station is Pachhapur station which is about 7 km from the identified node.

Airport: The nearest airport to the cluster is the Belagavi Airport which is about 28 km from the identified node location.

Description of each Land parcels within the Node

- **Vantamuri parcels: with around 4140 acres,** this land parcel forms the largest contiguous land parcel within this proposed node area and is preliminary notified. This site located about 9 km east of NH 4 and is connected by MDR passing via Biranholi, Kallatti and Jarakihole villages. The approach road is motorable and is a black topped single lane road, thus providing good connectivity with the NH4. The site can also be approached from NH4 through two other MDRs, originating from New Vantamuri village to Hidkal Dam and Islampura, which joins the road leading to Kallati at Islampura. This connectivity is the shortest connectivity from Belagavi city to Vantamuri and Islampura land parcels and measures around 11 kms from new Vantamuri village at NH4. These land parcels lie in close proximity to the Hidkal reservoir; however the topography of the site provides sufficient elevation from the reservoir's flood level. Further, the approach road which cuts across the site, runs on the ridge line segregates the northern part of the site which slopes towards the reservoir and the southern part of the site which slopes away from the road, thus physically segregated from the reservoir. The entire site is barren with no agricultural activities. The Vantamuri land parcels and the Mastiholi parcels are separated by a distance of around 2.5 kms by the reservoir's back waters. This land parcel is also connected to the nearest railway station at Pachhapur through an 8 kms long kutcha village road and is just around 19 kms through the Islampura MDR. With large land availability, with no agriculture activity and well connected to NH4 and to rail link, this site is best suited for development of the Node.[12]

Extent of Node and Land availability Status

Based the above-mentioned land parcels which were identified, notified and based on the possible available other govt. land parcels, the extent of the proposed Node site is tentatively delineated considering the village boundaries of these land parcels (final extent of the Node shall be delineated based on the actual cadastral boundaries). The total extent of the identified location for node is about **88.87 sq km (**21960.22 **acres)**[13]. Given below is a gist of the identified node area.

Given below is a gist of the identified node area.

Extent of the node	**88.87(21960.22 acres)**
Total area of notified/ acquired land by KIADB	16.76 sq km (4140acres)
Total area under government land holdings	10.51 sq km (2596.4 acres)
No: of settlements within	17
Total area under settlements	1.28 sq km (316.29 acres)
% of area under settlements	1.44%

[12] Based on the information given during the compilation of the earlier versions of the report on nodes, other land parcels in the proposed node were also considered for development. These parcels were Hataraki-Managutti, Biranholi parcels etc.

[13] The boundary is based on the respective village boundaries which has the possible availability of land.

Total area under agriculture(double crop, agricultural plantations)	10.14 sq km (2506.19 acres)
% of area under agriculture(double crop, agricultural plantations)	11.41%
Area under forest	36.15 sqkm (8932.85 acres)
% of area under forest	40.68%
Net area excluding forest, settlements & water body	48.94 sq km (12093.32 acres)
List of villages within the node	Aldhal, Basapur, Halabhavi,Naganur K.D, Naganur K.M, Bolasyanahatti, Benakanholi, Biranholi, Islampur, Vantmuri, Mastiholi, Managutti, Dadabanahatti

Node Size

The recommended node size for the Belagavi node (2027-32) is as given below.

Final Recommended Node Size for Belagavi Node	**44 sq km (11,000 acres)** **(27 sq km Industrial Area)**

Economic Benefits, Employment and Infrastructure Demands

Table: Economic benefits, Employment and Infrastructure Demands of Belagavi Node

	2017	2022	2027	2032	2037	2041
Investment in node (in USD million)	60.70	584.09	1583.76	3277.79	6128.20	9690.04
Turnover inside the node (in USD million)	294	2725	7263	15089	28203	44567
Exports inside the node (in USD million)	206	379	1009	2107	3945	6233
Employment in node*	4247	37695	94697	185697	326725	490436
Total Water Demand (in TMC)	0.09	0.82	2.13	4.38	8.13	12.76
Total Power Demand (in MW)	26	227	595	1204	2186	3374
Housing Demand (units)	8,131	69,424	1,74,518	3,45,701	6,11,772	9,25,235

**Employment indicates the projected direct employment*

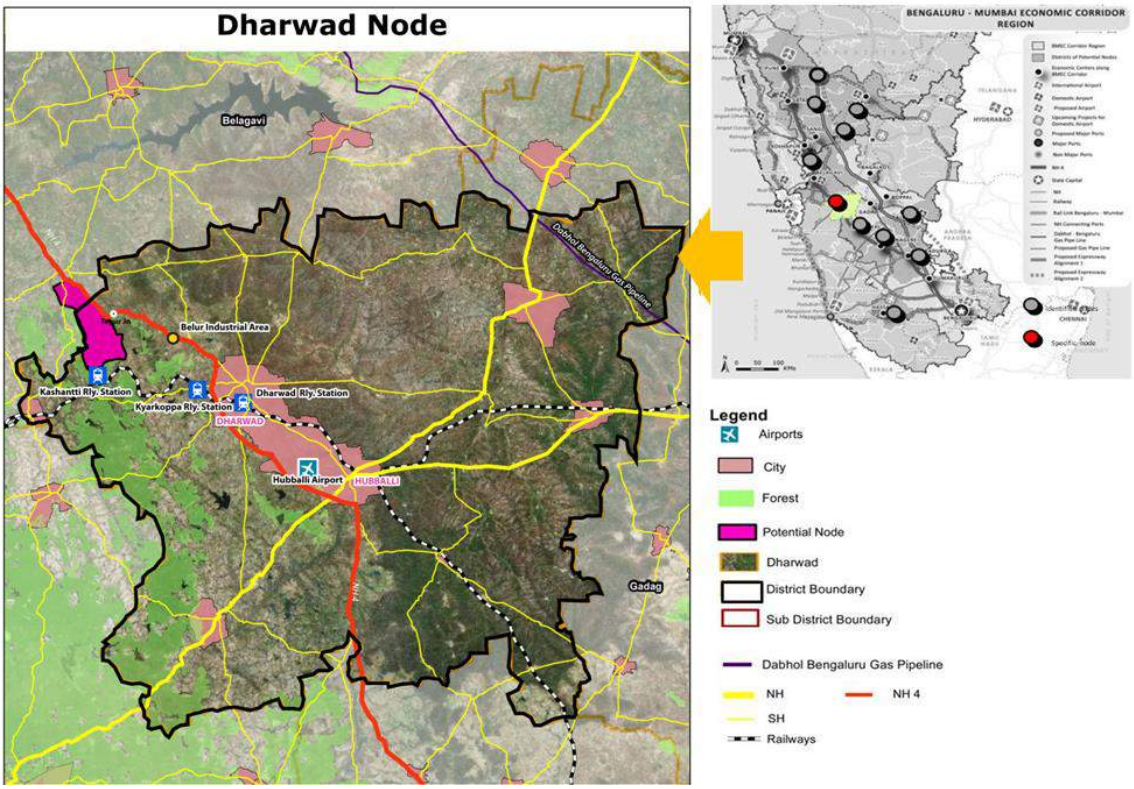
Source: CRIS analysis, Egis

Dharwad Node

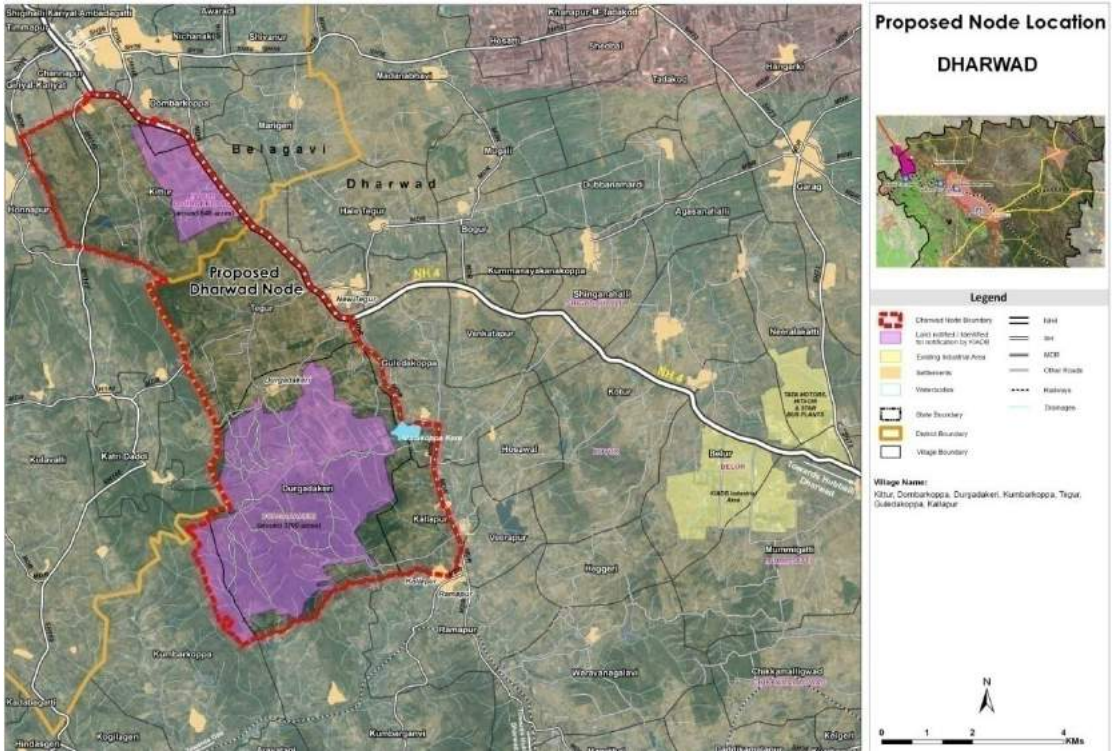
Kittur-Dombarkoppa-Durgadakeri, located across Dharwad sub-district (taluk) and Sampagaon sub district (taluk) of Belagavi is identified for development of BMEC Node at Dharwad.

The maps on the following page indicate the location of the identified node location with reference to BMEC Region & Hubballi-Dharwad City and the subsequent map showing the possible extent of identified, Kittur-Dombarkoppa-Durgadakeri node site.

Map: Location of Identified Node



Map: Possible Extent of Identified node



Location

Located around 23 km towards the north-west of Dharwad city, this node is located within Dharwad sub district (Dharwad District) and Sampagaon sub districts (Belagavi District). The cluster of Kittur-Dombarkuppa which is in Belagavi district is located along NH4 where as the Dugadakeri parcel is

located slightly away from the NH4. The identified cluster has predominantly notified land parcels of KIADB along with few government land holdings.

Connectivity & linkages

Road: The parcels of Kittur Dombarkuppa have excellent connectivity in terms of road linkages as the parcels lie on NH4. However Dugadakeri parcel is located away, towards west of NH4, with a distance of around 2.5 km from New Tegur village on NH4 and around 5 kms west of Venkatapur village on NH4.

Rail: The nearest railway line from the cluster is the Goa-Hubballi rail link which runs in close proximity to the souther most part o fthe site and the nearest railway station is Kashantti railway station which is about 2.5 km from the southern most boundary of the node site which is the Durgadakeri land parcel.

Airport: The node is located almost equidistant from two of the major airport so the region, the Hubballi Airport & Belagavi Airport. The nearest airport to the node location is the Hubballi Airport which is about 39 km south from the node. Belagavi airport is about 41 km north of the node location.

Description of identified Land parcels within the Node

There are two major identified land parcels around which the proposed node site is defined. The two parcels are located almost 6 kms apart and the inbetween land needs to be acquired to for the entore node site. The following part of the section elloborates the chareteristices of these land Parcels:

- **Kittur-Dombarkoppa parcel:** The parcel with an area of 648 acres, is located abutting NH 4, which is a six lane with service roads. The site runs almost around 3 kms along the NH4. This land falls within Belagavi district bordering Dharwad district.This land parcel is relatively flat terrain with mango plantations and maize cultivations. As per information provided by KIADB, the acquisition process is almost completed for this land parcels and hence is readily available for development.
- **Durgadekeri Parcels:** The parcel measures a total area of around 3700 acres and is located is about 2.6 km from NH 4. The site can be approached through a village road leading from New Tegur junction on NH4. There are about three approaches to the site where the one from Tegur – NH 4 junction is the shortest with around 2.6 kms. The other approach from Guledekoppa via Madhikoppakere is around 6 to 7 kms. Another approach from a village road leading from Singanahalli land parcels on NH4, lead to the southern part of the site, via Hosavaal, Kallapur, Veerapur and Rampura villages is around 9.5 kms. Even though as per the land use of the area, it is indicated as jungle/forest, during the site visit it was found that the land is predominantly barren with intermittent scrubs. As per information provided by KIADB, as per the land revenue records, the parcel is indicated as Kharab land (waste land) and hence, it is best suited for development. This entire land parcel is notified for acquisition by KIADB. However, as per the on-going legal proceeding the tribunal is expected to allot the entire land to Government.

Extent of Node and Land availability Status

As mentioned above, based on the land parcels which were identified, notified and possible available govt. land parcels, the extent of the proposed Node site is tentatively delineated, considering the village boundaries of these land parcels (final extent of the Node shall be delineated based on the actual cadastral boundaries). The total extent of the identified location for node is about **47.18 sq km**. Given below is a gist of the identified node area

Given below is a gist of the identified node area

Extent of the node	47.18 sq km (11658.41 acres)
Total area of notified land by KIADB	17.6 sqkm (4349.4 acres)
Total area under government land holdings	3.17 sq km (784.65 acres))
No: of settlements within	5
Total area under settlements	0.22 sqkm (54.36 acres)
% of area under settlements	0.47 %
Total area under agriculture(double crop, agricultural plantations)	18.51 sq.km (4573.67 acres)
% of area under agriculture(double crop, agricultural plantations)	39.23%
Area under forest	5.76 sq.km (1423.32 acres)
% of area under forest	12.21%
Total area excluding forest, agriculture, settlements & water body	40.54 sq.km (10017.64 acres)
List of villages within the node	Dombarkoppa,Durgadakeri, Guledakoppa, Tegur, Kallapur, Kittur, kumbarkoppa

Node Size

The recommended node size for the Dharwad node (2032-37) is as given below.

Recommended Node Size for Dharwad Node	**37 sq km (9213 acres)** **(22 sq km Industrial Area)**

Economic Benefits, Employment and Infrastructure Demands

Table: Economic benefits, Employment and Infrastructure Demands of Dharwad Node

	2017	2022	2027	2032	2037	2041
Investment in node (in USD million)	31.13	302.93	821.87	1700.96	3180.14	5028.50
Turnover inside the node (in USD million)	141	1280	3501	7249	13558	21463
Exports inside the node (in USD million)	9	111	326	681	1264	2011

Employment in node*	1084	9044	24553	48142	84946	128017
Total Water Demand (in TMC)	0.04	0.35	0.94	1.94	3.61	5.68
Total Power Demand (in MW)	12.15	100	271	551	1004	1556
Housing Demand (units)	3,737	31,856	81,228	1,61,815	2,88,064	4,38,062

**Employment indicates the projected direct employment*

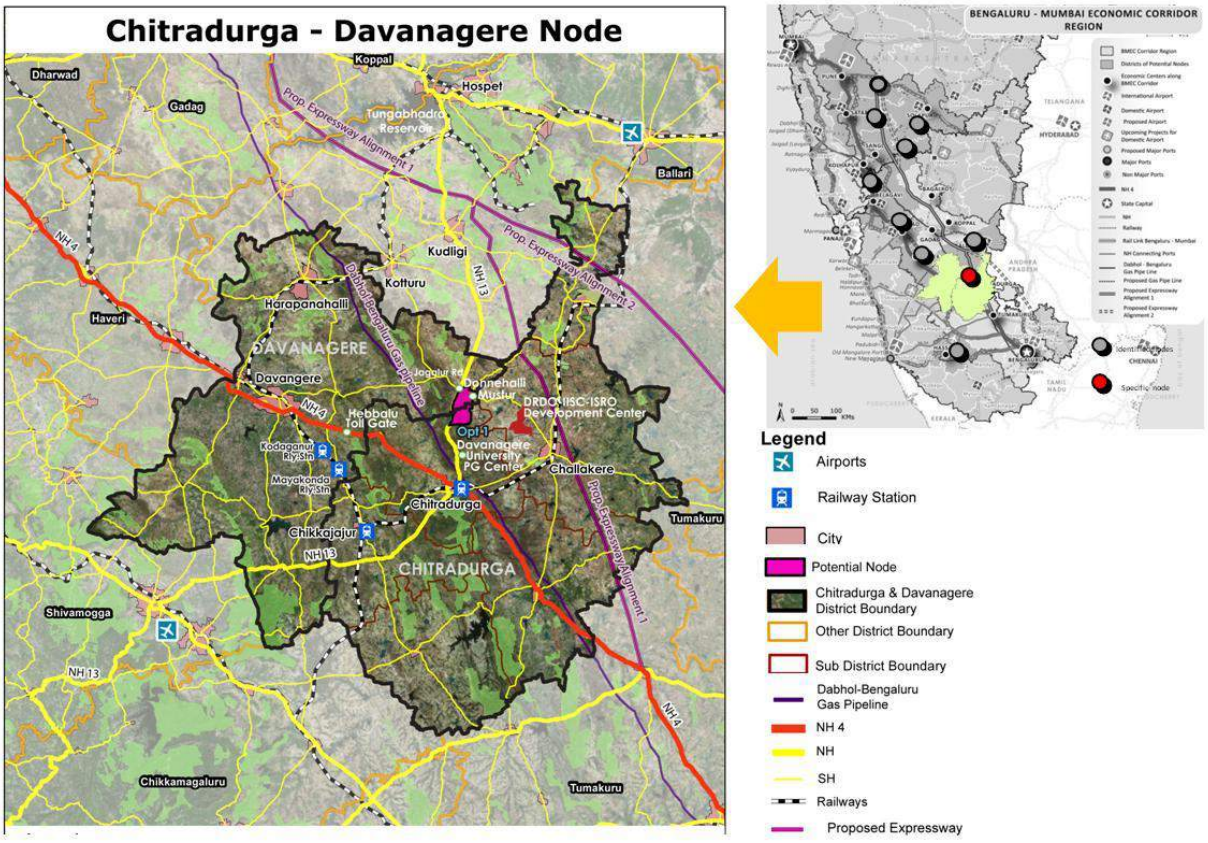
Source: CRIS analysis, Egis

Chitradurga- Davanagere Node

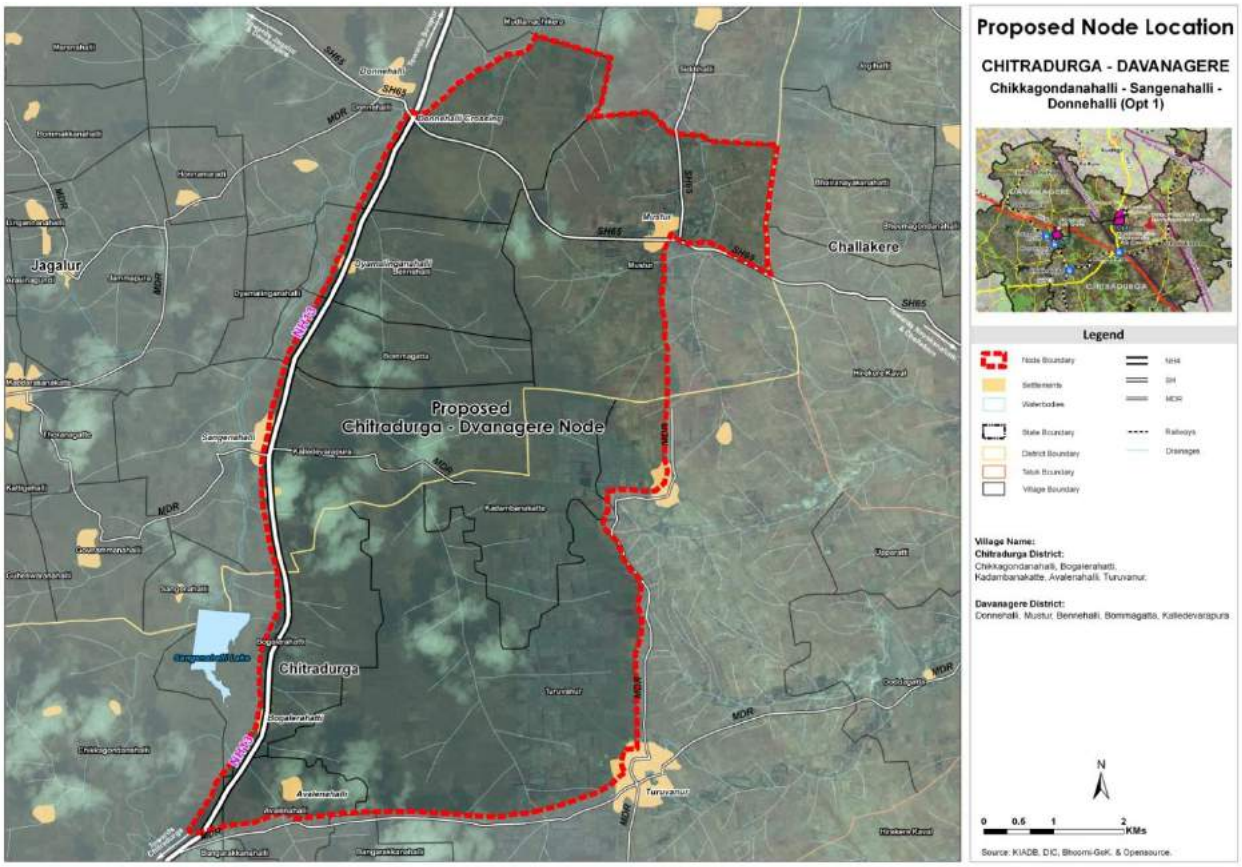
As per the above-mentioned assessments & its recommendations, site location, covering Chikkagondanahalli of Chitradurga Taluk of Chitradurga district and Sangenahalli- Donnehalli of Jagalur Taluk of Davanagere district, bordering both the districts was identified as an appropriate for location for node development.

The following maps indicate the location of the identified node location with reference to the cities of Chitradurga and Davanagere and the subsequent map shows the possible extent of identified, Chikkagondanahalli- Sangenahalli- Donnehalli node site in the two districts.

Map: Location of Node



Map: Possible Extent of the Node



Location

The identified Node. is located 18 km north of Chitradurga city *(around 10 km north of Davanagere University PG center on NH13) along* NH13 which connects Chitradurga to Hospet and is located 58 kms south east of Davanagere, which can be approached by SH 65 via Jagalur. The site is also in proximity to Ballari District with Kudilgi located just 52 kms from the site and Hosapete around 91 kms. The proposed node falls within Chitradurga and Jagalur Taluks/sub districts of Chitradurga and Davanagere respectively.

Connectivity and linkages

Road: The parcels have excellent connectivity in terms of road linkages, as mentioned above, the parcels lie along **NH13 which** connects Chitradurga to Hosapete, Ballari via Davanagere district and also leads to Sholapur of Maharashtra. The site can be approached from Davanagere City through **SH 65** which joins the **NH13** at Donnehalli via Jagalur. The site is also connected to NH4 through number of MDRs. One such MDR connects the site to NH4 at Bharamsagar which is around 30 kms away and another MDR connects the southern part of the site at Chikkagondanahalli which is around 22 kms from Bharamsagar at NH4. The site is also connected to the proposed DRDO-ISRO-IISC complex at Khundapur (17 kms from site) via SH65 and SH45 via Mustur and Nayakanahatty (15 kms from site). The same road connected to Challekere which is just 34 kms from the proposed site location.

Rail: The identified area lies about 22 km north of the existing rail link with the nearest station being the Chitradurga station. Another nearest location is Thalaku, which is around 28 km from the identified location and falls on Chitradurga-Ballari rail line. Lack of direct rail connectivity might

demand development of spur lines to the site which would be one of the major external infrastructure components of the node.

Airport: The nearest airports to the identified areas are Ballari airport-100 km, Hubballi airport- 160 km and Bengaluru airport-200 km.

Description of Land parcels within the Node

As mentioned above the site falls in both districts of Chitradurga and Davanagere. The Sangenahalli lake acts as a physical feature which separates the two districts. The area which falls between and around Chikkagondanahalli and Donnehalli, on either side of NH13 were identified as the potential location for the node. However, although majority of these land parcels falls under Single Crop and Waste land category, the areas which are to the western side of NH13 are found to have more cultivated land (some of the with double crop). Hence, the land area towards east of NH13 is identified for exploring the location of the node.

Chikkagondanahalli-Sangenahalli-Donnehalli: As explained above, majority of the land parcels are waste land or single crop land, with water for agriculture made available through bore wells. There are maize and patches of cotton are cultivated in this area. Few smaller land parcels with coconut, beetle nut and Banana plantation were also seen. The land is relatively flat with gradual undulations. This part of the district is one of the under developed parts of both the districts.

Dhabol- Bengaluru Gas Pipeline: The existing Dhabol- Bengaluru LNG gas pipeline by GAIL, runs closer to the proposed site location and is just 5kms south-west of the southern boundary of the identified location. This will be an added advantage for the site, which can have a direct connectivity (spur line) from this pipeline which will facilitate setting up Gas Based power plants and would act as an attraction for various Gas based industries.

Availability of Water: The area is a dry zone with no perennial water source. The Tungabhadra Reservoir at Hosapete located around 80 to 90 km north of the identified location and Bhadra reservoir which is around 75 to 80 km south of the identified location are the two potential water sources which can be explored. Cost of providing water to the site as be the node requirement is explained in the subseuqmet chapter.

Extent of Node and Land availability Status

The extent of the proposed Node site is tentatively delineated considering the village boundaries of villages around Chikkagondanahalli & Donnehalli villages *(final extent of the Node shall be delineated based on the actual cadastral boundaries)*. The total extent of the identified location for node is about **55 sq km (around 13700 acres).**

Given below is a gist of the identified node area

Extent of the node	13723.7 acres (55.5 sq km)
Total area of notified/ acquired land by KIADB	0
Total area under government land holdings	0
No: of settlements within	9
Total area under settlements	140 acres (0.57 sq km)

% of area under settlements	1.02%
Total area under agriculture(double crop, agricultural plantations)	1365.4 acres(5.5 sq km)
% of area under agriculture(double crop, agricultural plantations)	9.95%
Area under forest	0
% of area under forest	0
Net area excluding forest, settlements and water body	13549.5 acres (54.8 sq km)
List of villages within the node	**Chitradurga district:** Chikkagondanahalli, Bogalerahatti, Kadambanakatte, Avalenahalli, Turuvanur. **Davanagere District:** Donnehalli, Mustur, Bennehalli, Bommagatta, Kalledevarapura

Node Size

The recommended node size for the Chitradurga- Davanagere node (2037) is as given below.

Recommended Node Size for Chitradurga-Davanagere Node	**40 sq km (9870 acres) (24 sq km Industrial Area)**

Economic Benefits, Employment and Infrastructure Demands

Table: Economic benefits, Employment and Infrastructure Demands of Chitradurga-Davanagere Node

	2017	2022	2027	2032	2037	2041
Investment in node (in USD million)	29.80	277.97	766.03	1585.46	2964.16	4686.94
Turnover inside the node (in USD million)	123.61	1272	3439	7093	13341	21075
Exports inside the node (in USD million)	20.01	218.3	590.7	1216.5	2291	3619.2
Employment in node*	2282	23773	59780	116356	206206	309489
Total Water Demand (in TMC)	0.04	0.40	1.05	2.15	4.00	6.27
Total Power Demand (in MW)	10	97	254	508	923	1417
Housing Demand (Units)	3,667	32,280	80,760	1,58,422	2,78,994	4,19,223

**Employment indicates the projected direct employment*

.Source: CRIS analysis, Egis

14.1.4 Land Cost Assumptions

The land cost assumptions considered in the three nodes in Karnataka are as listed in the table below.

Table: Land Cost Assumptions, Karnataka Nodes

Nodes	Land Cost Assumptions
Belagavi Node: **Vantamuri- Managutti**	The identified land parcels within this area is expected to have a land price of around 5 to 15 lakhs per acre. With Land parcels located away from the NH4 costing around 5 lakhs per acre and the one closer or along NH4 ranging between 10 to 15 lakhs per acre. Further as per
Dharwad Node: **Kittur-Dombarkuppa-Durgadakeri**	The identified land parcels within this area is expected to have a land price of around 5 to 26 lakhs per acre. With land parcels located away from the NH4 costing around 5 lakhs per acre and the one closer or along NH4 ranging between 20 to 26 lakhs per acre. The Mummigatti land on NH4, which is located close to Belur industrial area, was acquired with a cost of around 26 acres per acres. The Durgadekeri land, which is predominantly Karab land is expected to be around INR 5 lakhs/ acres.
Chithradurga- Davanagere Node: **Chikkagondanahalli-Sangenahalli-Donnehalli**	The identified land parcels within this area is expected to have a land price (market value) of around 3 to 3.5 lakhs per acre for land parcels along NH13 and might range between 0.5 to 0.8 lakh per acre for land parcels which are located off NH13. Relatively lower land cost is an advantage for the site identified.

14.1.5 Preliminary Assessment of Cost of Providing Water to the Priority Node locations

Identified Water Sources

Following major water sources have been identified as potential sources for the industrial nodes being proposed.

1. **Malaprabha Reservoir**
2. **Hidkal Reservoir**
3. **Bhadra Reservoir**
4. **Tungabhadra Reservoir**
5. **Vanivilasa Reservoir**

Water Demand Estimations

The water demand estimations (Non Industrial, Industrial and Total) for the proposed nodes in Belagavi, Chitradurga- Davanagere and Dharwad are given in the table below.

Table: Water Demand (Non-Industrial use) for Industrial node cum megacities in Karnataka

No	Name	2017	2022	2027	2032	2037	2041
1	**Belagavi**	0.04	0.38	0.98	2.00	3.68	5.73
2	**Chitradurga- Davanagere**	0.02	0.18	0.46	0.93	1.70	2.63

3	Dharwad	0.02	0.18	0.46	0.94	1.73	2.71
4	Ballari	0.00	0.17	0.54	1.19	2.28	4.52
5	Hassan	0.00	0.09	0.31	0.66	1.25	2.45
6	Haveri	0.00	0.03	0.11	0.23	0.44	0.86

All figures in TMC

Table: Water Demand (Industrial use) for Industrial node cum megacities in Karnataka

No	Name	2017	2022	2027	2032	2037	2041
1	Belagavi	0.05	0.44	1.15	2.38	4.45	7.03
2	Chitradurga- Davanagere	0.02	0.22	0.59	1.22	2.31	3.64
3	Dharwad	0.02	0.18	0.48	1.00	1.87	2.97
4	Ballari	0.00	0.14	0.47	1.03	1.99	4.01
5	Hassan	0.00	0.09	0.30	0.67	1.29	2.59
6	Haveri	0.00	0.04	0.14	0.31	0.59	1.18

All figures in TMC

Table: Total water demand for Industrial node cum megacities in Karnataka

No	Name	2017	2022	2027	2032	2037	2041
1	Belagavi	0.09	0.82	2.13	4.38	8.13	12.76
2	Chitradurga- Davanagere	0.04	0.40	1.05	2.15	4.00	6.27
3	Dharwad	0.04	0.35	0.94	1.94	3.61	5.68
4	Ballari	0.01	0.31	1.01	2.22	4.27	8.54
5	Hassan	0.00	0.18	0.61	1.33	2.54	5.04
6	Haveri	0.00	0.08	0.24	0.54	1.03	2.05

All figures in TMC

Phasing and Costing

Phasing

Phasing of the water infrastructure is proposed considering the following:

- To fulfil the initial or intermediate demand of the nodes and to phase out the cost of infrastructure based on overall development of the node
- To explore multiple sources, to minimise dependability on single source and also to minimise the impact on water available for irrigation from an independent source.
- To minimise the initial investment required towards development of water infrastructure

Table: Break up of phase wise water demand considered for nodes

S. no.	Industrial Node	Year of estimation	Water Demand (TMC)	Phase
1.	**Belagavi**	**2022**	**0.82**	**Initial/ Intermediate**
		2032	**4.38**	**Final Phase**

2.	**Chitradurga**	**2022**	**0.40**	**Initial**
		2032	**2.15**	**Intermediate**
		2037	**4.32**	**Final Phase**
3.	**Dharwad**	**2022**	**0.35**	**Initial**
		2032	**1.94**	**Intermediate**
		2037	**3.61**	**Final Phase**

Costing

The preliminary costing of water infrastructure has been done based on the levels of source and the node, intermediate topography (including high ridges or valley requiring cross drainage works), cost of master balancing reservoir, cost of electromechanical components for efficient pumping, cost of support infrastructure, cost of water treatment plant along with all modern operations and then trunk network for regulated distribution.

Table: Phase wise preliminary costing for water supply to the node locations

Node	Location	Water source	Year	Water Demand (TMC)	Cost (INR Crores)
Belagavi	Vantamuri-Mastihole-Managutti	Hidkal Reservoir	2022	0.82	141.13
		Hidkal Reservoir	2032	4.38	417.00
Chitradurga - Davanagere	Chikkagondanahalli-Sangenahalli-Donnehalli	Tungabhadra reservoir	2022	0.40	671.41
		Tungabhadra reservoir	2032	2.15	851.72
		Tungabhadra reservoir	2037	4.32	1037.84
		Bhadra reservoir	2022	0.40	878.41
		Bhadra reservoir	2032	2.15	1045.53
		Bhadra reservoir	2037	4.32	1217.88
		Vanivila sagar reservoir	2022	0.40	525.74
		Vanivila sagar reservoir	2032	2.15	681.14
		Vanivila sagar reservoir	2037	4.32	841.25
Dharwad	Kittur-Dombarkuppa-Durgadakeri	Malprabha reservoir	2022	0.35	310.54
		Malprabha reservoir	2032	1.94	447.88
		Malprabha reservoir	2037	3.61	586.82
		Hidkal reservoir	2022	0.35	488.77
		Hidkal reservoir	2032	1.94	640.65
		Hidkal reservoir	2037	3.61	794.91

Recommendations

For all industrial nodes cum Mega city locations; the criterion of prioritizing the water resource locations is as per the following:

1. **The source can sustainably spare required quantity of water**
2. **The operational energy and cost requirements are less**
3. **The infrastructure (capital) cost is optimum.**
4. **The increased water demand in future can be met through new potential water resources for which techno-economic feasibility may be conducted.**

Table: Water Resource Identification for the Nodes

District	Node	Water source	Remark	Recommendation
Belagavi	Vantamuri-Mastiholi-Managutti	Hidkal Reservoir	• Reservoir has just sufficient capacity to cater the water demand till the year 2037. • However other possibilities in terms of upstream /downstream water storage site may be explored to mitigate the shortage of water for irrigation.	• The irrigation water saving need to be in place including minimizing the water losses in conveyance and application. • The implementation of sprinklers/micro irrigation system in the area will be beneficial to make additional water available for other than irrigation purpose. • The same can be proliferated between first (2022) and final phase (2032) in the command area of the Hidkal reservoir with intensive support (technical, financial, awareness campaigns etc.).
Dharwad	Kittur-Dombarkoppa-Durgadakeri	Malaprabha	• Malaprabha reservoir is the most suited option for all the phases- Initial (year 2022), intermediate (year 2027) and final phase (year 2037).	• However, the options for additional supplies from Hidkal should be kept as an alternative if it is being developed as industrial node cum megacity. • The other options in the upstream or downstream of Malprabha reservoir may also be explored to tap the surplus water yields.
Chitradurga - Davanagere	Chikkagondanahalli-Sangenahalli - Donnehalli	Tungabhadra	•Tungabhadra and Bhadra both the reservoir are having plenty of water but Vanivilas Sagar is the nearest water source with constraints of water availability (as per KWDT award only 8.2 TMC available partially being utilized for Irrigation).	• Tungabhadra seems to be best optional as per the initial invest cost for infrastructure but the operational cost /energy requirements are comparatively higher than that of Bhardra. • A detailed techno-economic study may be taken to finalize between the options.

14.2 Node Locations: Maharashtra

As mentioned in the previous chapter, the following are the identified core districts and its target sub districts for the development of nodes in Maharashtra as per the Location Suitability Assessment carried out.

Table: List of identified core districts and target sub districts in Karnataka as per the Location Suitability Assessment - Maharashtra

Sl no:	Core district identified as per location suitability assessment	Target sub districts identified
1	Pune	Baramati Indapur, Daund, Bhor **
2	Satara	Man, Khatav, Koregaon, Phaltan, Karad
3	Solapur	Mangalvedhe**, Sangole, Solapur South
4	Sangli	Atpadi**, Jat**

Source: MIDC & Department of Industries

*NOTE: **From various subjective analyses, this has emerged as a probable potential location. The possibility of establishing nodes in these locations is to be re-evaluated.*

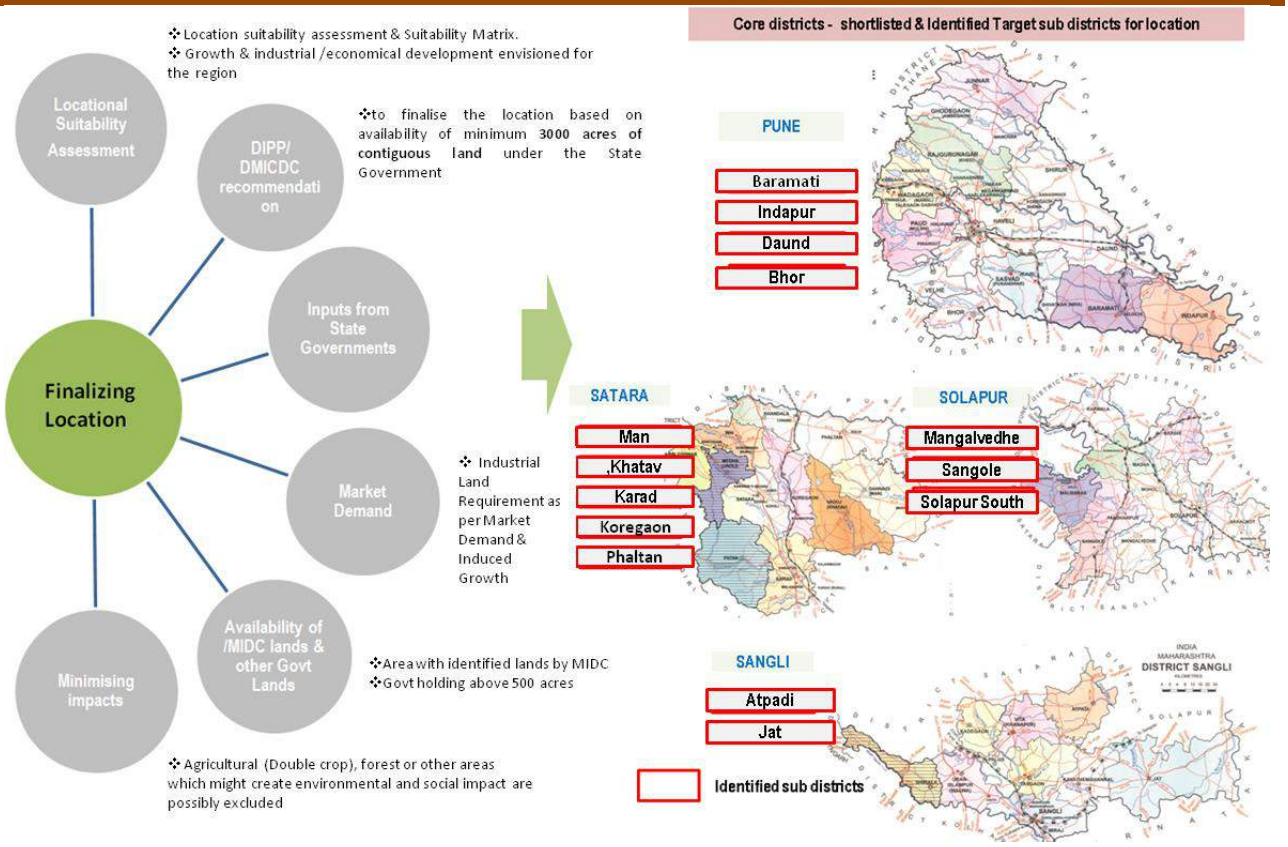
As per the meeting held with Department of Industries & MIDC, GoM it was decided that out of the districts identified within the BMEC region of Maharashtra to locate potential nodes, development of 2-3 nodes have to be identified on a priority basis. The identification of potential core districts and Taluks were based on the following parameters:

- **Location suitability assessment**
- **Possibility of land availability**
- **Inputs provided by Department of Industries & MIDC, GoM**

14.2.1 Process of Identifying locations for Priority Nodes cum Mega City

Even though, it was very clear that based on market demand assessment, that Pune and Satara has the potential to be developed on priority, GoM decided to carry out the process of identifying the appropriate location for all four potential districts. The various steps in the process are summarised in the following table.

1. Factors Leading to Identification of Node Locations



The factors considered for identifying the node locations within the core districts are as follows

- Maximizing utilization of land parcels under Government ownership to minimize need for land acquisitions.
- The proximity to NH 4 & proposed Greenfield Expressway is given priority in deciding the site locations
- Agricultural (Double crop), forest or other areas which might create environmental and social impact are possibly excluded.
- Explore possibilities of promoting development in the less developed eastern part of the districts of Satara, Sangli, Pune and Solapur districts
- Proximity to water sources which can meet the water demands of the industrial node.

The factors considered in identifying node locations in the potential four core districts are detailed below.

1. Based on inputs from MIDC on possible location of nodes, based on ease of land availability and based on data on possible Govt. land holdings with more than 500 acres of land within the same sub-districts, as per data provided by Office of Settlement Commissioner, were mapped and assessed to identify the best possible location for the node. The following map and table illustrates the same:

Map: Locations identified by MIDC and govt land holdings in the prioritised taluks by MIDC

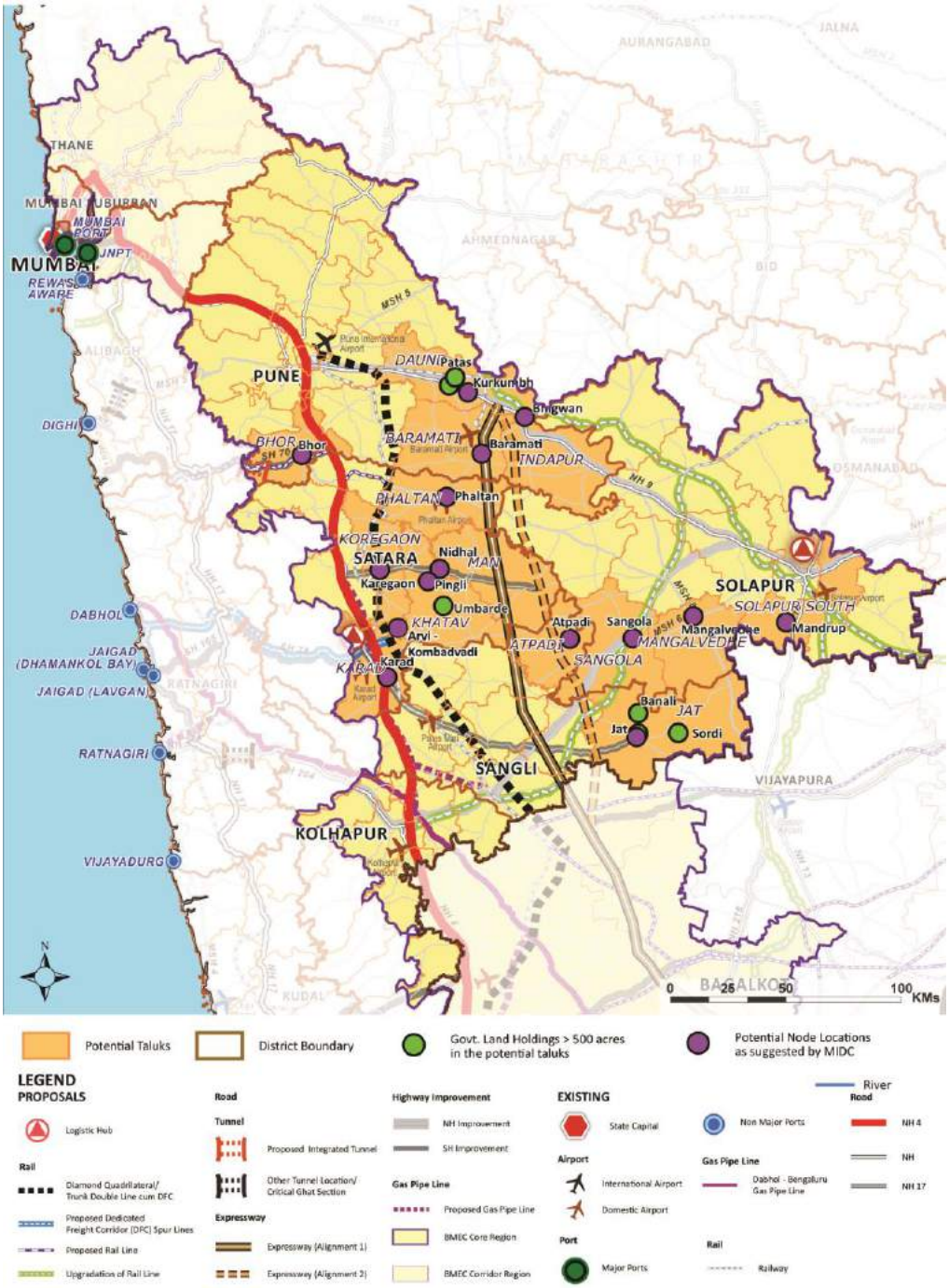


Table: List of potential locations as per MIDC prioritisation along with govt land holdings above 500 acres in those taluks

Sl no:	List of Core districts identified for locating nodes (identified and prioritised by MIDC for locating nodes)	Sub District/ Taluks	Potential location	Possible availability of land (in Hectare)	Villages with Govt land holdings > 200 ha (approx. 500 acres) in the taluks	Possible availability of land (in hectares)*
1	Pune	Baramati	Baramati,	-		
		Daund	Kurkumbh	-	Patas	566

		Indapur	Bhigwan	-		
		Bhor	Bhor	-		
2	Satara	Khatav	Nidhal&Khatav	2522	Umbarde	2104
		Man	Man &Khatav	1419		
		Koregaon	Koregaon	-		
		Phaltan	Phaltan	438		
		Karad	Karad	1855		
		Karad-Koregaon-Khatav	Arvi- Kombadvadi			
3	Sangli	Atpadi	Atpadi	-		
		Jat	Jat	-	Jat	3322
					Banali	481
					Sordi	2200
4	Solapur	Mangalvedhe	Mangalvedhe	-		
		Solapur South	Mandrup	-		
		Sangole	Sangole	-		

** Total of all parcels above 500 acres within the village*

These identified locations were further verified by MIDC and confirmed that, these government land parcels are not available for development and thus cannot be considered for the locating the potential nodes. Hence it was decided to explore the locations identified by MIDC as listed in the table above and it was decided to explore the same based on availability of water, land required for industrial development, proximity to National Highway and other industrial infrastructure paratmters.

2. Proximity to Water Sources

All major water sources located in close proximity to the identified potential sub -districts under the four BMEC districts of Maharashtra were identified[14] and distance of these sources were presented in the following table:

Table: Water Source Proximity to Locations

List of core districts identified for locating nodes	Sub district/ taluks	Potential location	Nearest reservoir within 100 km radius	Distance in km *
Pune	Bar Amati	Baramati,	Ujjani(Bhigwan) reservoir	23
	Daund	Kurkumbh	Ujjani (Bhigwan) reservoir	24
	Indapur	Bhigwan	Ujjani (Bhigwan) reservoir	0.5
			Nira river	40
	Bhor	Bhor	Bhatghar lake	2.5-5

[14]The maps of the major reservoirs are shown in section 2.8 of this chapter

			Shiv sagar (Koyna reservoir)	38-45
Satara	Khatav	Nidhal& Khatav	Yeralwadi dharan	17
			Shiv sagar (Koyna reservoir)	66
	Man	Man & Khatav	Yeralwadi dharan	15
			Shiv sagar (Koyna reservoir)	60-70
	Koregaon	Koregaon	Shiv sagar (Koyna reservoir)	40-50
			Kanher dam	26
	Phaltan	Phaltan	Vir reservoir	39
	Karad	Karad	Varna reservoir	38
			Shiv sagar (Koyna reservoir)	42
	Karad-Koregaon-Khatav	Arvi-Kombadvadi	Varna reservoir	50
			Shiv sagar (Koyna reservoir)	40
Sangli	Atpadi	Atpadi	Yeralwadi dharan	47
	Jat	Jat	Yeralwadi dharan	93
Solapur	Mangalvedhe	Mangalvedhe	Mhasvad lake	60
			Bheema river	75
			Ujjani(Bhigwan) reservoir	66-75
	Solapur south	Mandrup	Makani reservoir	81
			Ujjani(Bhigwan) reservoir	93
	Sangole	Sangole	Ujjani(Bhigwan) reservoir	69-75
			Bheema river	75
			Mhasvad lake	37

14.2.2 Industrial land demand and Node Size-Maharashtra

The industrial land demand for the identified core districts and nodes are as follows

Table: Phase Wise Industrial Land Area Requirement (in sq km) for identified Priority Districts and Nodes

Districts	2017		2022		2027		2032		2037		2041	
	Dst. IA	Node IA *	Dst. IA	Node IA *	Dst. IA	Node IA *	Dst. IA	Node IA *	Dst. IA	Node IA *	Dst. IA	Node IA *
Pune	0.87	0.69	8.96	7.17	24.64	19.71	53.99	43.20	106.63	85.31	176.00	140.80
Satara	0.01	0.01	0.89	0.71	3.18	2.54	7.51	6.01	15.26	12.21	32.87	26.30
Sangli	0.03	0.02	1.46	1.17	4.94	3.95	11.61	9.28	23.65	18.92	50.89	40.71
Solapur	0.04	0.03	2.03	1.62	7.22	5.78	16.94	13.55	34.57	27.66	74.26	59.41

**80 % of District Industrial Area is considered as Node's Industrial Area*

Ideal Node Size

Based on the National Manufacturing Policy guideline, it is assumed that an ideal Industrial Node cum Mega city shall have its 30% of its area as processing zone and balance would be the non-processing zone which will cater to the social infrastructure requirements and support amenities required for the Industrial Development. The following table presents the land required for development of Nodes in such scenario.

Table: Land requirement (in sq km) as per suggested ideal size for the proposed Node cum Mega City development

	District	2017	2022	2027	2032	2037	2041
1	Pune	2.31	23.89	65.70	143.99	284.35	469.33
2	Satara	0.04	2.37	8.48	20.02	40.70	87.66
3	Sangli	0.08	3.89	13.17	30.95	63.07	135.70
4	Solapur	0.10	5.40	19.26	45.18	92.19	198.04

Recommended Node Size

With no large contiguous land readily available with the government and due to various limitations in mobilising large parcels of land and considering the fact that the projected industrial development directly depends on development of the Industrial development through Govt's initiative, it was decided to assume a larger share of land for Processing Zone. Also considering the fact that development of majority of the non-processing components can happen through direct private sector initiatives, the share of Processing Zone was assumed to be around 60. Final phase wise land requirements for each node in Maharashtra are presented in table below. However, land available at each identified location determines proposed horizon period and size of the node. Based on the parameters discussed above, horizon period proposed for Pune, Satara and Sangli/Satara are 2032, 2041 and 2037 respectively.

Table: Recommended Node size based on development strategies

	District	2017	2022	2027	2032	2037	2041
1	Pune	1.15	11.94	32.85	71.99	142.18	234.67
2	Satara	0.02	1.19	4.24	10.01	20.35	43.83
3	Sangli	0.04	1.95	6.59	15.47	31.53	67.85
4	Solapur	0.05	2.70	9.63	22.59	46.10	99.02

Figures in sq km

14.2.3 Criteria and Methodology for short listing and finalising node locations

As it was confirmed by MIDC that there are no large government land holdings available to the extent of land required for node development and fresh acquisition was the only possibility for development of nodes. It was decided to short list two locations out of the broad list of potential sub-districts under each of the potential districts. These two locations were decided to be identified based on the following criteria:

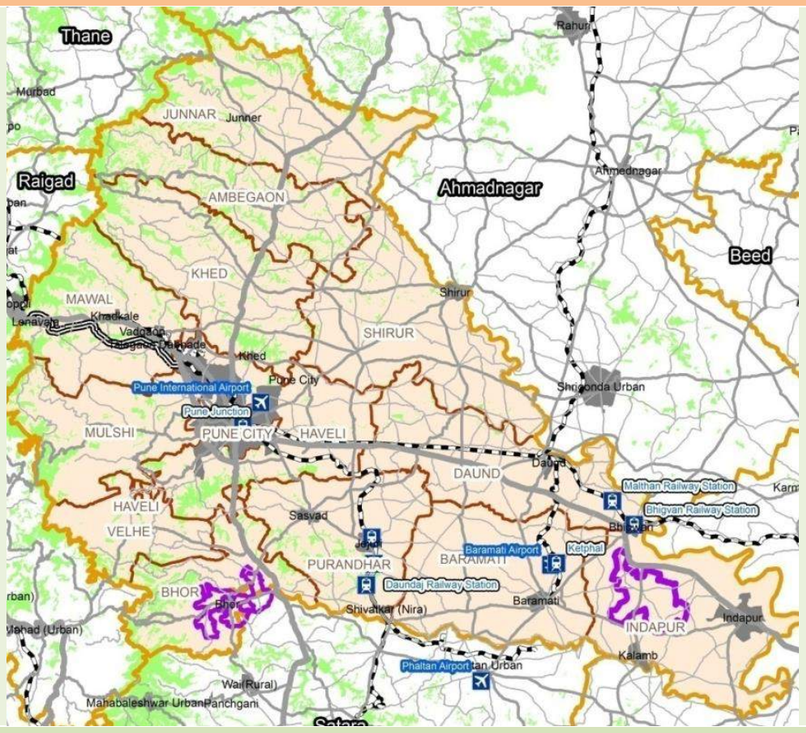
1. **One of the two locations to be identified in close proximity/ nearest possible location to National Highway 4(NH4) and in proximity to identified potential water sources.**
2. **Another location to be identified towards far eastern part of the districts, which are also under developed, expected to have relatively lower land cost, but probably away or with limited options for water source.**
3. **Ease of land availability as per inputs from MIDC.**

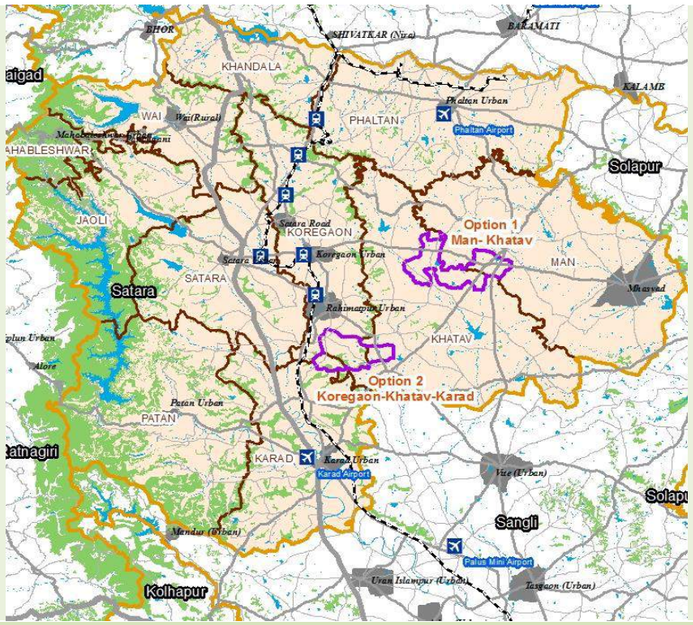
The two locations identified under each of the potential district would be assessed based on various parameters like, connectivity, existing land use, proximity to port and other industrial infrastructure

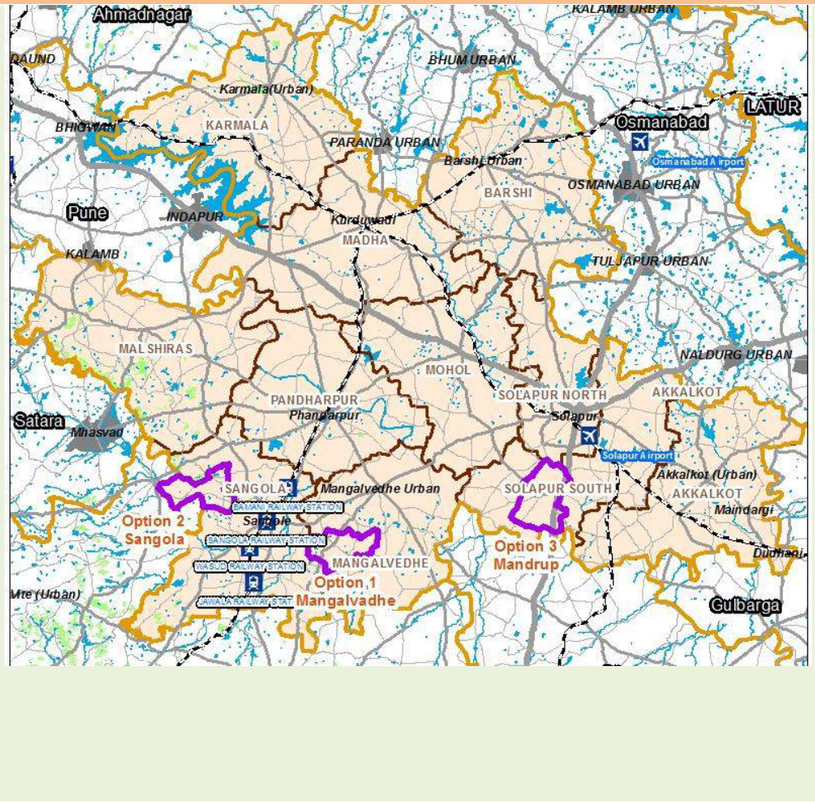
components and it was decided to finalise the best **possible location through a comparative assessment based on cost of land acquisition and cost of provision of water.**

The following table summarises the above-mentioned process of identifying two alternative locations for each of the four potential districts.

Table: Criteria and Methodology for short listing Node Locations

Possible Nodes	Sub Districts included	Village / Location names	Criteria for Selection	Shortlisted Locations Based on Selection Criteria		
				Sub Districts	**Potential Location**	**Spatial Location**
PUNE						
Possible Node 1	Baramati	Baramati	• **LAND AVAILABILITY:** All except Indapur are located in close proximity to Pune and are much more influenced by Pune's development. Hence the availability of land in these districts would be relatively difficult. • **DEVELOPMENT SCENARIO**: Out of these four, Indapur is the eastern most part of Pune district and is relatively less developed & industrialised, when compared to the Bhor, Daund & Baramati • **WATER SOURCE PROXIMITY:** Compared to Daund & Baramati, Indapur also has the advantage of being in close proximity to two of the identified potential water sources, Ujjani Reservoir & Nira River. • **NH 4 PROXIMITY:** Bhor, although located in proximity to Pune city, it's the only sub district among the four, to be located in close proximity to NH4. It also has the advantage of having number of water sources located in close proximity	**Indapur**	**Bhigwan**	
Possible Node 2	Daund	Kurkumbh				
Possible Node 3	Indapur	Bhigwan		**Bhor**	**Bhor**	
Possible Node 4	Bhor	Bhor		**Estimated total land requirement by 2041**		**57822.7 acres (234 sq km) Out of which industrial area is about 140.8 sq km**
				Minimum Node size recommended (as to fulfill 2032 demand)		**17791.6 acres (72 sq km) Out of which industrial area is about 43 sq km**
SATARA						
Possible Node 1	Khatav	Nidhal&Khatav	**LAND AVAILABILITY**: • MIDC has identified possible land parcels which can be acquired/ mobilised for 4 sub-districts, this includes Man, Khatav, and Phaltan& Karad Khatav has the largest land parcel with more than 2500 ha. • Land parcels identified under Man (Pingli-1419 ha.) are located adjacent to the one identified in Khatav (Nidhal). Man & Khatav from a parcel of around 4000 ha.	**Khatav-Man**	**Nidhal-Pingli**	
Possible Node 2	Man	Man &Khatav				

Possible Node 3	Koregaon	Koregaon	**DEVELOPMENT SCENARIO:** • Man, Khatav & Phaltan are located on the eastern, less developed parts and Koregaon & Karad are relatively well developed. **DEVELOPABLE LAND:** • Man and Khatav have more than 52% & 35% of the land area under waste land fallow land category respectively. **CONNECTIVITY** • Karad has the advantage of having direct access to both Rail (Bengaluru- Mumbai)& Road (NH4)connectivity and is also located on NH4, has better port connectivity compared to other 4 sub-districts and also has an airstrip. • Koregaon has the advantage of its proximity to Satara city and has direct rail access (Bengaluru- Mumbai). Although it's located relatively in close proximity to NH4, it does not have direct access to it. • Although Karad favours the alternative site location to be identified in close proximity to NH4, however, with relatively large presence of forest areas (more than15%), with more than 28% of its area under double crop, which is the largest share among all the 5 sub-districts and also among all the sub-districts of Satara, Koregaon might be considered for this alternative.	**Karad-Koregaon-Khatav**	**Arvi Kombadvadi**	
Possible Node 4	Phaltan	Phaltan				
Possible Node 5	Karad	Karad				
				Estimated total land requirement by 2041	**10828.2acres (44 sq km) Out of which industrial area is about 26.3 sqkm**	
				Minimum Node size recommended	**10828.2acres (44 sq km) Out of which industrial area is about 26.3 sqkm**	
SANGLI						
Possible Node 1	Atpadi	Atpadi	As there are only two sub-districts identified, both these locations would be considered as the two alternative locations which will be assessed for finalisation through a comparative assessment	**Atpadi**	**Atpadi**	
Possible Node 2	Jat	Jat		**Jat**	**Jat**	
				Estimated total land requirement by 2041	**16,766 acres (67 sqkm) Out of which industrial area is about 41 sqkm**	
				Minimum Node size recommended (as to fulfill	**7,791acres (32 sqkm) Out of which industrial area is about 19 sqkm**	

					2037 demand)	
SOLAPUR						
Possible Node 1	Mangalvedhe	Mangalvedhe	**DEVELOPABLE LAND:** • Among the three potential sub-districts of Solapur, Sangole & Mangalvedhe has more than 26 % & 18% of its area under waste, fallow land categories respectively and has around 59% & 68% of the land under single crop cultivation • South Solapur is relatively lesser waste land area with only 13% **DEVELOPMENT SCENARIO:** • South Solapur, due to its proximity to Solapur city, is relatively better urbanised than other two sub-districts However as per discussions held with the GoM, Mandrup is also identified as a potential location for Solapur Node.	**Mangalvedhe**	**Mangalvedhe**	
Possible Node 2	Solapur South	Mandrup		**Sangole**	**Sangole**	
Possible Node 3	Sangole	Sangole		**South Solapur**	**Mandrup**	
				Estimated total land requirement by 2041		**24,466 acres (99 sqkm) Out of which industrial area is about 59 sqkm**
				Minimum Node size recommended (as to fulfill 2037 demand)		**11,390acres (46 sqkm) Out of which industrial area is about 28 sqkm**

Based on the above-mentioned assessment, two alternative sites were identified under each of the districts .The following table summarises the details of the identified two site locations within the ecah of the four potential districts which will be considered for comparative assessment on cost of land and provision of water:

PUNE	
Site Option 1: Bhor	**Site Option 2: Indapur**
Location • Located along SH-70 (main connectivity to Dighi Port from NH4) • 3 km away from NH4 • Spreads across Bhor taluk of Pune district and Khandala taluk of Satara district, covering an area of around 114sqkm which would be able to accommodate a Node cum mega city of around 72 sq km	**Location** • Located along NH 9 which is the main connectivity between Pune and Solapur which is further connected to Hyderabad. • 88 km away from NH4 • Lies in Indapur taluk and covers an area of around 186 sq km to accommodate a node of 72 sq km.
Connectivity and linkages **Road:** • Located along SH-70 (main connectivity to Dighi Port from NH4). • 3 km away from NH4 **Rail**: • 24 km west from the Mumbai- Bengaluru link via Belagavi and Sangli. • Nearest station is Walhe station (25 km from the identified area) • Lack of direct rail connectivity demand development of spur lines to the site **Airport:** • Nearest airport is Pune International Airport (40 km) **Port connectivity:** • Nearest port is Dighi port (90km)	**Connectivity and linkages** **Road:** • Located along NH 9 which is the main connectivity between Pune and Solapur which is further connected to Hyderabad. • Site can be approached from Pune City through **NH 9** directly which joins the site about 5 km after Bhigwan town. **Rail:** • 7 km south from the existing Pune-Solapur line. Nearest station is Bhigwan station (8 km from the identified area). • Lack of direct rail connectivity demand development of spur lines to the site **Airport:** • Baramati Airport (15 km) • Pune International Airport (90 km) **Port connectivity:** • Nearest port is Dighi port (183km)
Nearest water source • Bhatghar lake (2 km from the site) • Other major water source to the site is Koyna reservoir (Shiv Sagra) at a distance of 38 km.	**Nearest water source** • Ujjaini (Bhigwan reservoir) which is at a distance of about 3 km from the site
SATARA	
Site Option 1: Man- Khatav	**Site Option 2: Koregaon**
Location • Located along SH-74 which is a main connectivity between Satara and Solapur.	**Location** The site identified is located approximately 3.5 km from NH 4 which is the spine of the BMEC Region. The

• 38 km from NH4- from Satara and around 157 km towards west of Solapur. • Spreads across Man and Khatav taluks of Satara, covering an area of around 122 sq km which would be able to accommodate a Node cum mega city of around 39 sq km.	site is located at a distance of around 30 to 40kmsNorth of Satara City and the earmarked area covers an area of around 126 sq km to accommodate a node area of around 39 sq km.
Connectivity and linkages **Road:** • Lie along SH 74 which connects Satara to Solapur. • Also well connected to Karad through SH 69 & SH10 with a distance of around 57 km & 43 km respectively **Rail**: • Located 19 km east from the Mumbai-Bengaluru link via Belagavi and Sangli. • Nearest stations are Koregaon station (23.5 km from the identified area) and Rahimatpur station (23 km) Lack of direct rail connectivity might demand development of spur lines to the site **Airport:** • Nearest airport is Satara airport which is about 45 km. Karad & Phaltan airports are also located within a distance of around 57 and 43 km. **Port connectivity:** • Nearest ports are Dabhol and Jaigad (more than 125 km) and would be connected through, Karad- Chiplun, State Highway.	**Connectivity and linkages** **Road:** • Lies along NH 4. • Site can be approached from Wele on NH 4 through the Wai Solshi road. The distance between NH 4 (Wele) and the site through this connectivity is approximately 3.5 km. The site can also be reached from Joshi Vihir on NH 4 through Shirgaon (distance of approximately 7 km). **Rail:** • 1 km from the existing Pune – Satara rail line. • Nearest station to the site is Wathar (1 km). • Lack of direct rail connectivity through the site might demand development of spur lines. **Airport:** • Nearest airport is Baramati airport (43 km) and can be accessed using SH 61 and SH 221. • Pune International (95 km) can be accessed through NH 4. **Port connectivity:** Nearest port to the site is Dighi port at (178 km) & can also reach Dabhol & Jaigad Ports, which are located at a distance of around 200 km via Karad.
Nearest water source • Yeralwadi Dharan (17 km from the site). • The other major water source to the site is Koyna reservoir (Shiv Sagar) (66 km)	**Nearest water source** Shivsagar (Koyna Reservoir) (35 km).

SOLAPUR

Site Option 1: Mangalvadhe	Site Option 2: Sangola	Site Option 3: Mandrup
Location • Located 15 km south west of Mangalvedhe town and North West of Sangole town. • Covers an area of around 112 sq km which would be able to accommodate a Node cum mega city of around 46 sq km	**Location** • Located to the North-West of Sangole town, bordering Atpadi Taluk in Sangali District. • The identified site covers an area of around 112 sq km which will accommodate a node of around 46 sq km	**Location:** • Located 14 km to the South of Solapur town. The identified site location covers an area of around 158.47 sqkm which would be able to accommodate a Node cum mega city of around 46 sqkm.

Connectivity and linkages **Road:** • Major State Highways 11 passes through the site and is connected to Solapur city which is at a distance of 140 km from NH4 to the West. • Proposed Greenfield Express Highway (alignment 2) is at a distance of 51km from the identified site. **Rail**: • Nearest station is Sangole (17km). • Other nearby stations includes Bamani, Wasud and Jawala. **Airport:** • Nearest airport is located in Solapur at a distance of 67km, which is also expected to have a Greenfield airport in the near future **Port connectivity:** • Jaigad port is the nearest port which will be approached via Karad located at a distance of 195 km.	**Connectivity and linkages** **Road:** • Identified site is connected to & located in close proximity to SH-71, SH-76 and SH-136 and also through several Major District roads. • NH-4 can be reached via SH-76 and is at a distance of 93km. **Rail:** • Nearest station is Sangole at a distance of 12km. • Other nearby stations includes Bamani, Wasud and Jawala. **Airport:** • The nearest airport is located in Solapur at a distance of 94km. **Port connectivity:** • Jaigad port is the nearest port which can be approached through Karad located at a distance of 228 km.	**Connectivity and linkages:** **Road:** • NH 13 and SH 149 pass through the site thus making it a well-connected location. The site is connected to Pune through NH 13 and NH 9 (260 km). NH 4 is at a distance of 250 km from the site via SH 58, SH 41, SH 141 and NH 13. **Rail:** • Nearest stations are Aherwadi, Sulerjavalge, Tadval and Hotgi railway stations (10-15 km) on the Hotgi- Bagalkote- Gadag link. The Solapur railway station is approximately 15 km north of the site on the Pune- Kalaburgi rail link. **Airport:** • The nearest airport is located in Solapur at a distance of 14km. **Port connectivity:** • Jaigad port is the nearest port which can be approached through Karad located at a distance of 255 km.
Nearest water source • Mhasvad Lake (60 km from the site). • The other potential water sources to the site are Bheema River and Ujjani(Bhigwan) reservoir located at a distance of 75 and 65 km respectively.	**Nearest water source** • Mhasvad Lake (37 km from the site). • The other potential water sources to the site are Bheema River and Ujjani (Bhigwan) reservoir located at a distance of 75 and 69 km respectively.	**Nearest water source:** • The nearest potential water source to the site is Yashwant Sagar Reservoir at a distance of 110 km.

SANGLI

Site Option 1: Atpadi	Site Option 2: Jat
Location • Located along SH-143 and proposed Express Highway (alignment 2) and approximately 70	**Location** • Located along SH-140/SH-78 and 130 km away from NH-4.

km away from NH4. • Located at the border of Sangli and Satara district in Atpadi taluk. • The identified locations cover an area of around 65 sq km to accommodate a node of around 32 sq km	• The site is located at Jat Taluk. • Proposed Express Highway (alignment 2) can be reached via SH-140 at a distance of 27km. • The site covers an area of around 72 sq km to accommodate a node area of around 32 sq km.
Connectivity and linkages **Road:** • Identified parcels lie along SH 143 which connects Pandharpur town in the East at a distance of about 50 km and to Karad on NH4 to the West at a distance of about 65 km. • Site is also well connected to Mhaswad town at 20 km, Sangole town at 40 km and Vita town at 38 km. • Through SH 143 via Pandharpur, the NH9 is only around 75 Km which is an advantage to the proposed site location. **Rail**: • Proximity to both Bengaluru- Mumbai line via Miraj and also Miraj Solapur line towards east of the node. • Site is 65 km east of the existing Bengaluru-Mumbai line and the nearest station is Dalgaon station (40 km South East of the identified area located on Miraj-Solapur line). **Airport:** • Nearest airport to the identified area is located in Karad which is at a distance of about 70 km. **Port connectivity:** • Jaigad port is the nearest port accessed via Karad located at a distance of 170 km.	**Connectivity and linkages** **Road:** • The site is connected to Karad (120 km) and Kolhapur (115 km), which are major urban centres in the region. • SH-140 connects the site to Tasgaon (70 km) in the West and SH71 connects it to Sangole town in the North at a distance of 45 km. **Rail:** • Jat Road Station is the nearest station to the identified site (27km to the North-West) • Kavathe Mahankal station is well connected to the site by SH-140 and located at a distance of 45km. **Airport:** • Palus Airport is located at a distance of 95km and can be accessed by SH-140/SH76. **Port connectivity:** • Jaigad port is the nearest port accessed viaKarad located at a distance of 225 km.
Nearest water source • The nearest water source to the area is Yeralwadi dharan which is at a distance of about 47 km from the site.	**Nearest water source** • The nearest water source to the area is Yeralwadi dharan which is at a distance of about 93 km from the site, however due to lack of sufficient water, the Mahishal LIS located at a distance of around 15 km is identified as a major water source for the proposed node.

14.2.4 Cost of Providing Water to the alternative Node locations

Identified Water Sources

The following were identified as the potential water sources which can be explored, based on inputs from Water Resource Department, considering parameters like, its proximity to the identified node locations and availability of water:

1. **Shiv sagar Reservoir (Koyna River)**
2. **Ujjani Reservoir (Bheema River)**
3. **Bhatgar Dam**
4. **Neera River &Bheema Rivers**
5. **Thakari & Mahishal Lift Irrigation**

Majority o f the identified water sources are predominantly utilised for irrigation purpose, except few of the sources which are utilised for the purpose of power generation and drinking water supply.

Water Demand Estimation for Priority Nodes

Water demand - Industrial

Industrial water demand estimations for each node were based on sector wise water consumption standards as per the land demand estimates considered for each node, under each sector.

Table: Water Demand (Industrial use) for Industrial node cum megacities in Maharashtra

No	Name	2017	2022	2027	2032	2037	2041
1	Pune	0.05	0.47	1.29	2.83	5.60	9.24
2	Satara	0.00	0.08	0.27	0.65	1.32	2.83
3	Solapur	0.00	0.17	0.60	1.41	2.88	6.18
4	Sangli	0.00	0.12	0.39	0.93	1.89	4.06

Figures in thousand million cubic feet (TMC)

Water demand estimates of Non Industrial uses

The water demand for non industrial water uses is as summarised in the table below.

Table: Water Demand (Non-Industrial use) for Industrial node cum megacities in Maharashtra

No	Name	2017	2022	2027	2032	2037	2041
1	Pune	0.13	1.14	3.02	6.35	12.00	19.11
2	Satara	0.00	0.04	0.16	0.36	0.72	1.49
3	Solapur	0.00	0.13	0.45	1.03	2.03	4.21
4	Sangli	0.00	0.09	0.30	0.69	1.39	2.90

Figures in TMC

As mentioned these are broad estimates/ approximates estimates to work out the node wise water demand at regional level and exact water demand estimates would be carried out as part of the detailed master plan, which would have exact areas and land use wise land break ups

Total water demand

Table: Total Water Demand for Industrial node cum megacities in Maharashtra

No	Name	2017	2022	2027	2032	2037	2041
1	Pune	0.17	1.61	4.31	9.18	17.60	28.34
2	Satara	0.00	0.12	0.43	1.01	2.04	4.32
3	Solapur	0.01	0.30	1.05	2.44	4.91	10.39
4	Sangli	0.00	0.21	0.70	1.62	3.27	6.97

Figures in TMC

Phasing and costing

Phasing

The water infrastructure for each of the nodes has been phased based on the optimum demand requirement in the initial, intermediate phase and ease of expansion for the demand of final phase. The following table provides the detailed break-up of the intermediate year and the water demand considered for each of the nodes:

Table: Break up of phase wise water demand considered for nodes

S. no.	Industrial Node	Year of estimation	Water Demand (TMC)	Phase
1.	**Pune**	**2022**	**1.61**	**Initial phase**
		2027	**4.31**	**Intermediate**
		2032	**9.18**	**Final Phase**
2.	**Satara**	**2022**	**0.12**	**Initial phase**
		2032	**1.01**	**Intermediate**
		2041	**4.32**	**Final Phase**
3.	**Sholapur**	**2022**	**0.3**	**Initial phase**
		2027	**1.05**	**Intermediate**
		2037	**4.91**	**Final Phase**
4.	**Sangli**	**2022**	**0.21**	**Initial phase**
		2027	**0.70**	**Intermediate**
		2037	**3.27**	**Final Phase**

Costing

Table: Phase wise preliminary costing for water supply to the two alternative node locations under each node

Node	Location	Water source	Year	Water Demand (TMC)	Cost (INR Crores)
Pune	Indapur	Ujjani reservoir	2022	1.61	156
		Ujjani reservoir	2027	4.31	416
		Ujjani reservoir	2032	9.18	777
		Nira River	2022	1.61	458
		Nira River	2027	4.31	735
		Nira River	2032	9.18	1371
Pune	Bhor	Shivsagar Reservoir	2022	1.61	558

		Shivsagar Reservoir	2027	4.31	962
		Shivsagar Reservoir	2032	9.18	1835
		Bhatghar	2022	1.61	154
		Bhatghar	2027	4.31	411
		Bhatghar	2032	9.18	818
Satara	Man Khatav	Shivsagar Reservoir	2022	0.12	605*
		Shivsagar Reservoir	2032	1.01	737*
		Shivsagar Reservoir	2041	4.32	1357*
Satara	Koregaon-Karad-Khatav (Arvi-Kombadvadi)	Shivsagar Reservoir	2022	0.12	562*
		Shivsagar Reservoir	2032	1.01	686*
		Shivsagar Reservoir	2041	4.32	1271*
Sholapur	Sangole	Ujjani reservoir	2022	0.3	550
		Ujjani reservoir	2027	1.05	625
		Ujjani reservoir	2037	4.91	1249
		Bhima River	2022	0.3	551
		Bhima River	2027	1.05	630
		Bhima River	2037	4.91	1271
Sholapur	Mangalvedhe	Ujjani reservoir	2022	0.3	549
		Ujjani reservoir	2027	1.05	621
		Ujjani reservoir	2037	4.91	1229
		Bhima River	2022	0.3	550
		Bhima River	2027	1.05	626
		Bhima River	2037	4.91	1255
Sholapur	Mandrup	Ujjani reservoir	2022	0.3	732
		Ujjani reservoir	2027	1.05	808
		Ujjani reservoir	2037	4.91	1526
		Bhima River	2022	0.3	92
		Bhima River	2027	1.05	159
		Bhima River	2037	4.91	512
Sangli	Atpadi	Thakari LIS	2022	0.21	95
		Thakari LIS	2027	0.7	128
		Thakari LIS	2037	3.27	475
	Jat	Mahisal LIS	2022	0.21	131
		Mahisal LIS	2027	0.7	164
		Mahisal LIS	2037	3.27	401

* *integration of Tarali & Urmodi irrigation canal system to transport water to Satara nodes is expected to reduce the cost of water supply to these nodes. However, technical viability of the same needs to be explored.*

Recommendations

For the industrial node cum Mega city locations; the criterion of prioritizing the water resource locations is as per the following:

1. **The source can sustainably spare required quantity of water**
2. **The operational energy and cost requirements are less**
3. **The infrastructure (capital) cost is optimum.**

4. **The increased water demand in future can be met through new potential water resources for which techno-economic feasibility may be conducted.**

Table: Water Resource Identification for the Nodes

District	Node	Water source	Remark	Recommendation
Pune	Indapur	Ujjani reservoir	• Source has sufficient water • Infrastructure and operational cost is very less being nearer to node	Based on water availability and availability of multiple water sources, Industrial Node cum Mega city location at Bhor is preferred over the location at Indapur. Considering the fact that the demand for Pune node is around 9 TMC (by 2032) and it might have impact on the water available for irrigation, the initial (1.6 TMC) or intermediate (4.3 TMC) Phase of water supply can be meet through lifting from Nira river also. It is also recommended to create a separate storage to store the excess water available during rainy season and utilise the same for node.
		Nira River	• Source has sufficient water • Infrastructure and operational cost is very less being nearer to node	
	Bhor	Shivsagar Reservoir	• The Sources has sufficient/surplus water • Has potential to fulfill future demands	
		Bhatghar	• The Sources has sufficient water for phase-1 • The infrastructure and the operational cost is very less being nearer to node	
Satara	Man-Khatav	Shivsagar/ Koyana dam	• Source has long term surplus water	Drawback would be the high capital cost which can be borne to get a reliable water supply. Integration of Tarali & Urmodi irrigation canal system to transport water to both the Satara nodes, is expected to reduce the cost of water supply to these nodes. However, technical viability of the same needs to be explored.
	Koregaon-Karad-Khatav	Shivsagar/ Koyana dam		
Solapur	Mangalvedhe	Ujjani Dam Bhima River	• Both the sources i.e. Ujjani dam or lifting from Bhima are suitable water source as the ssources has sufficient water.	Infrastructure and the operational cost is relatively higher. If Pune node is developed at Indapur, then the water availability might be an issue. Hence it is recommended to consider the node development at Solapur in the second phase.
	Sangole	Ujjani Dam Bhima River		
	Mandrup	Ujjani Dam Bhima River		
Sangli	Atpadi	Thakri LIS	These LIS would be the suitable source (the distribution network i.e. maincanals/disrtibutaries/minors/sub-minors are being constructed). The same infrastructure may be used for the purpose of provision of	The cost of canal /piped infrastructure maybe shared with the Irrigation department. The Water Utilization capacity of these canal systems are 9.29 & 17.36 TMCs for Thakri and
	Jat	Mahisal LIS		

			water to the node, as these have the sufficient capacity to cater to both, initial Phase/ Intermediate Phase (0.7 TMC) and ultimate phase (3.27 TMC) demands of the industrial nodes.	Mahisal LIS respectively.

14.2.5 Land Cost Assumptions

The following table provides the guidance value of the land rates for large land parcels (i.e. hectares) for agriculture lands and fallow land category as provided under by Department of Registration and Stamps, GoM, for each of the identified taluks of the identified node locations. As per inputs provided the market consultants, the market rates of the land, are around 20% to 30% more than the guidance value and the land rates per this assumption are also presented the table.

List of core districts identified for locating nodes	Sub district/ taulks	Potential site location of the Node	Land Price in Lakhs/ha (Dept. of Registration & Stamps, GoM)	Land Price in Lakhs /acre (Dept. of Registration & Stamps, GoM)	Assumed Market value, Land price in Lakhs/acre
Pune	Indapur	Bhigwan	2.72 to 5.48	1.66	2.16
	Bhor	Bhor	2.5	1.01	1.32
Satara	Khatav	Nidhal&khatav	2.3 to 4.25	1.33	1.72
		Umbarde (g)			
	Man	Man &khatav-Pingli	1.45 to 3.8	1.19	1.55
			2.31 to 4.43		
	Karad-Koregaon	Arvi Kombadvadi	2.23 to 2.98	1.05	3.03
Sangli	Atpadi	Atpadi	2.54 to 8.63	2.26	2.94
	Jat	Jat	1.84 to 4.51	1.29	1.67
		Banali (g)			
		Sordi (g)			
Solapur	Mangalvedhe	Mangalvedhe	1.96 to 3.44	1.09	1.42
	Sangole	Sangole	1.24 to 2.19	0.69	0.90
	Solapur South	Mandrup	2.18 to 2.96	1.04	2.88

Based on inputs from MIDC & based other secondary sources, a range of land rates are assumed for each of the taluk and the same is presented as following:

Node	Rate (lakhs/ acre)	Remarks
Bhor	8 to 12	Based on its proximity to NH4 and Pune city
Indapur	7 to 10	Based on proximity to NH9 and also relative proximity to Pune
Koregaon	6 to 10	-
Man &Khatav	4 to 6	-

Jat&Atpadi	3 to 5	-
Mangalvedhe	4 to 6	
Sangole	2 to 4	-
Mandrup	5 to 7	

14.2.6 Comparative assessment of Cost of Providing Water and Cost of Land

A comparative assessment based on the estimated preliminary costing for provision of water to two alternative Node locations within each of the four districts from identified sources and also based on the land cost of these two alternative locations were carried out and the same is illustrated in the following table.

Table: Recommended site locations and comparative assessment

Core district	Sub District / Taulks	Potential location	Land price (in INR Lakhs/ acre)	Water source	Industrial land requirement- 2041 (in sqkm)	Ideal node size* (in sqkm)	Recommended node size ** (in sqkm)	Preliminary costing of Provision of water to Nodes from Source (Total Demand of Node) In Crs	Cost of Providing water per acre (in INR Lakhs/ acre)	Preliminary costing of Provision of water to Nodes from Source (Initial Phase)
Pune	Indapur	Bhigwan	7 to 10	Ujjani(bhigwan) reservoir & Neera	140.8	469.3	72 (2032)	777-1371	4.4 to 7.7	156-458
	Bhor	Bhor	8 to 12	Bhatghar lake & Shiv sagar(koyna reservoir)				818-1835	4.6 to 10.3	154-558
Satara	Khatav-Man	Nidhal-Pingli	4 to 6	Shiv sagar(koyna reservoir)	26.3	87.7	44 (2041)	1357	12.5	605
	Koregaon	Arvi Kombadvadi	6 to 10	Shiv sagar(koyna reservoir)				1271	11.6	562
Sangli	Atpadi	Atpadi	3 to 5	Thakari Lift Irrigation	40.71	135.7	31.5 (2037)	475	6.1	95
	Jat	Jat		Mahishal Lift Irrigation				401	5.2	131
Solapur	Mangalvedhe	Mangalvedhe	4 to 6	Neera & Bheema River, Ujjani(bhigwan) reservoir (66 km)	59.41	198	46.1 (2037)	1229- 1255	10.8 to 11	549-550

	Sangol e	Sangole	2 to 4	Ujjani(bhigw an) reservoir (69 km), Mhaswad lake (37 km)				1249- 1271	11 to 11.2	550- 551
	Solapur South	Mandrup	5 to 7	Ujjani reservoir (101 km), Bheema River (10 km)				512 -1526	4 to 13	92- 732

**30% of node area as processing zone and balance would be the non-processing zone*

***60% of node area as processing zone and balance would be the non-processing zone*

The recommendations on finalisation of the locations in each district are as follows:

WATER COST	LAND COST	OTHER CONSIDERATIONS	RECOMMENDATION
PUNE			
Cost from Ujjaini Reservoir to Indapur Node and Bhatghar lake to Bhor node is almost same. Water capacity of Bhatghar Lake might not fulfil the ultimate water demand of Bhor node and best option is to provide water from Shiva Sagar. This will cost more than around INR 10.3 Lakhs per acre, is considered to be marginally higher cost.	Land cost between the two node locations is marginal (around 1 to 2 lakhs per acre)	Bhor due to its proximity to Western Ghats, does not have conducive topography, hence it would be difficult to get a contiguous land parcel of around 72 sq km.	Indapur, with its proximity to NH9 & Rail connectivity, with potential to mobilise large land parcels and possibility of exploring two water sources and with relatively lesser land and water provision cost, it is recommended for location of BMEC Pune node at Indapur.
SATARA			
The cost variation in provision of water between these two locations is around INR 270 Crs indicating a difference of around INR 2.7 Lakhs / acre.	The land cost difference between the two locations is also around INR 2 to 4 Lakhs/ acre.	Koregaon is located in close proximity to NH4, Ports and also due to the fact that the cost of providing other infrastructure connectivity would be less expensive. However, there is no government land parcesl available for development and mobilising land will be very expensive and would be difficult process due to its proximity to NH.	MIDC has already identified potential areas for Industrial development in this area and mobilising large parcel of land would also be relatively easier. Hence,with lesser land cost, ease of mobilising land and also due to the fact the cost difference in provision of water is marginal, Man-Khatav would be preferable for the development of BMEC Satara node.

SANGLI			
Preliminary cost of provision of water from Thakari & Mahishal Lift Irrigations Schemes would be the determining factor	Land cost between the two node locations is marginal		Atpadi, with relatively less cost of provision of water is recommended for development of Industrial Node cum Mega City.
SOLAPUR			
Preliminary cost estimations for water supply is relatively less for Mandrup	The land cost has variation of around INR 3 Lakhs.		Based on the comparative assessment, it is recommended node cum mega city to be located at Mandrup.

14.2.7 Priority Node cum Mega cities of Maharashtra- Finalised site locations

With Pune district having the highest demand for Industrial development within the entire BMEC region and also having the largest industrial land requirement; it will be ideal to prioritise the development of Indapur Industrial Node of Pune district.

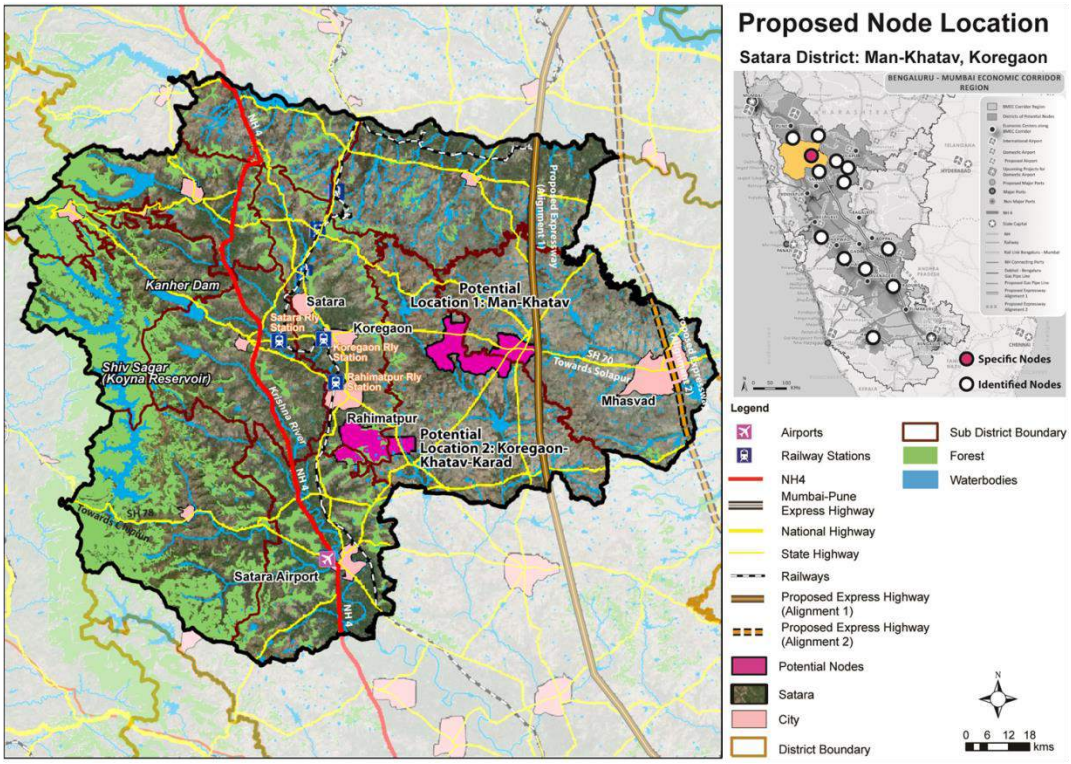
However, land parcels are yet to be identified for mobilisation in this area. Further, there is also a need to decentralise industrial development from Pune-Mumbai Region and to promote development in rest of the less developed/ under developed areas. Hence, Man-Khatav, which is located towards east of Satara is being considered for priorisation. With more than 39 sqkm of land already identified for mobilisation in this area, Man-Khatav of Satara, is recommended as Maharashtra's Priority node under BMEC. With around 18.5 sqkm, Karad- Koregaon can be considered for development of proposed logistic hub

In case of both Sangli & Solapur, considering relatively high cost of provision of water and also considering the limited water availability of the sources, development of this node is recommended to be considered as Phase 2 development. This phasing will provide sufficient time period for establishment of micro irrigation schemes in the area, which will facilitate availability of water for industrial development.

Based on the outcome of the comparative analysis of provision of water and land cost ans other factors as discussed above, Node at Satara is identified as the priority nodes of Maharashtra.

Satara Node: Man- Khatav and Karad-Khatav-Koregaon

Map: Location of identified nodes: Satara



Satara Node: Man- Khatav

Location

The site identified is located along SH-74 which is a main connectivity between Satara and Solapur. The identified site is approximately 38 km away from NH4- the spine of BMEC region. The location identified is spreading across Man and Khatav taluks of Satara . The location of the site can be referred to from the maps in the following pages.

Extent of Node

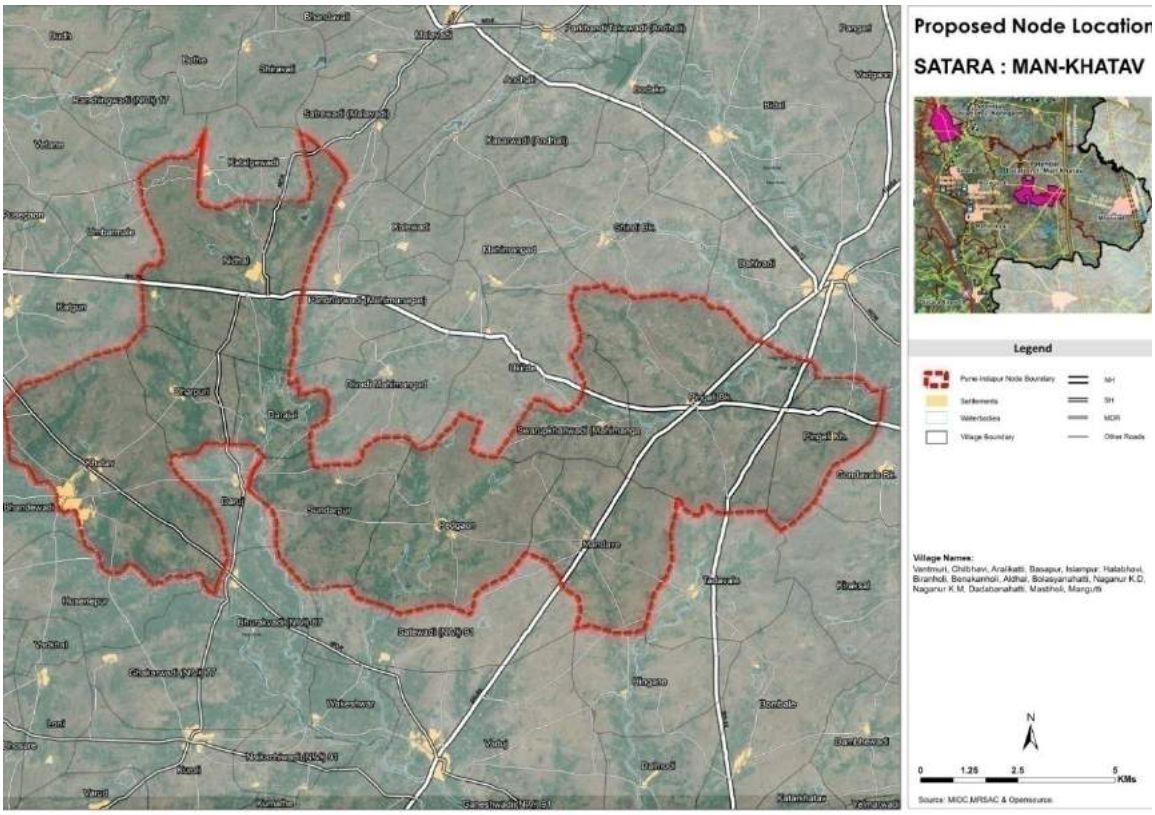
The extent of the proposed Node site is tentatively delineated considering the village boundaries of these land parcels (final extent of the Node shall be delineated based on the actual cadastral boundaries). The total extent of the identified location for node is about **122.34 sqkm out of which the net available area will be about 115.29 sqkm.**

Given below is a gist of the identified node area.

Extent of the node	**122.34 sq km**
Total area under settlements	1.44sqkm
% of area under settlements	1.18%
Total area under agriculture(double crop, agricultural plantations)	2.07 sqkm
% of area under agriculture(double crop, agricultural plantations)	1.69%
Area under forest	0 sqkm

% of area under forest	0%
Area under water bodies	3.53 sqkm
% of area under water bodies	2.89%
Net area excluding forest, settlements and water body	115.29 sqkm

Map: Possible Extent of the identified node: Man- Khatav



Satara Node: Koregaon

Location

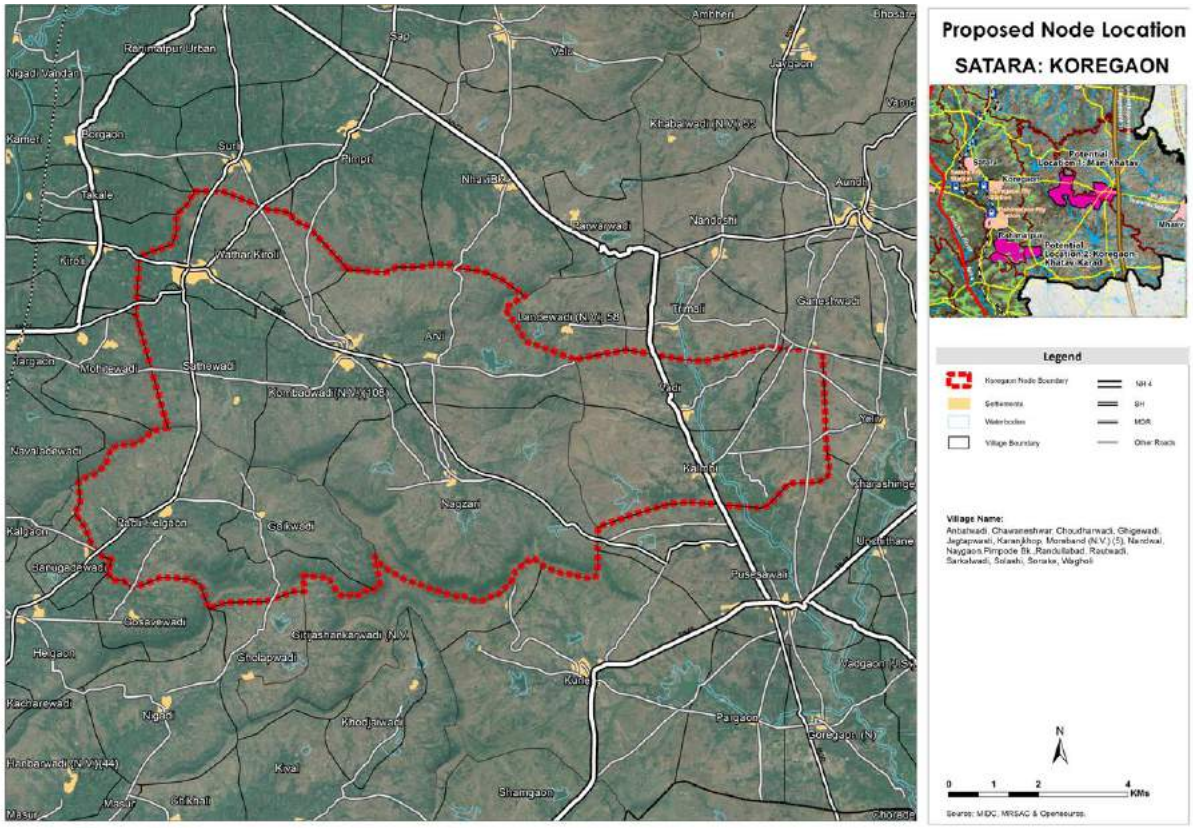
The site identified is located approximately 12 km from NH 4 which is the spine of the BMEC Region. The site is located at a distance of around 30 km South East of Satara City.

Extent of Node

The extent of the proposed Node site is tentatively delineated considering the village boundaries of these land parcels (final extent of the Node shall be delineated based on the actual cadastral boundaries). The total extent of the identified location for node is about **93 sq km.** Given below is a gist of the identified node area.

Extent of the node	**93 sq km**
Total area under settlements	1.17 sq km
% of area under settlements	1%
Total area under agriculture(double crop, agricultural plantations)	53.85 sq km
% of area under agriculture(double crop, agricultural plantations)	57%
Area under forest	14.97 sq km
% of area under forest	16%
Area under water bodies	1.49 sq km
% of area under water bodies	1.6%
Net area excluding forest, settlements and water body	75.67 sqkm

Map: Possible Extent of the identified node: Koregaon- Karad- Khatav



Economic Benefits, Employment and Infrastructure Demands

Table: Summary of Estimations for Satara Node

	2017	2022	2027	2032	2037	2041
Investment in node (in USD million)	2	100	373	873	1783	3830
Turnover inside the node (in USD million)	6	348	1342	3181	6463	13945
Exports inside the node (in USD million)	1	85	355	844	1689	3663
Employment in node*	140	8347	28456	63253	120910	241439

**Employment indicates the projected direct employment*

Source: CRIS analysis

14.3 Proposed Population Distribution in Greenfield & Brownfield Urban Areas of BMEC Core Region

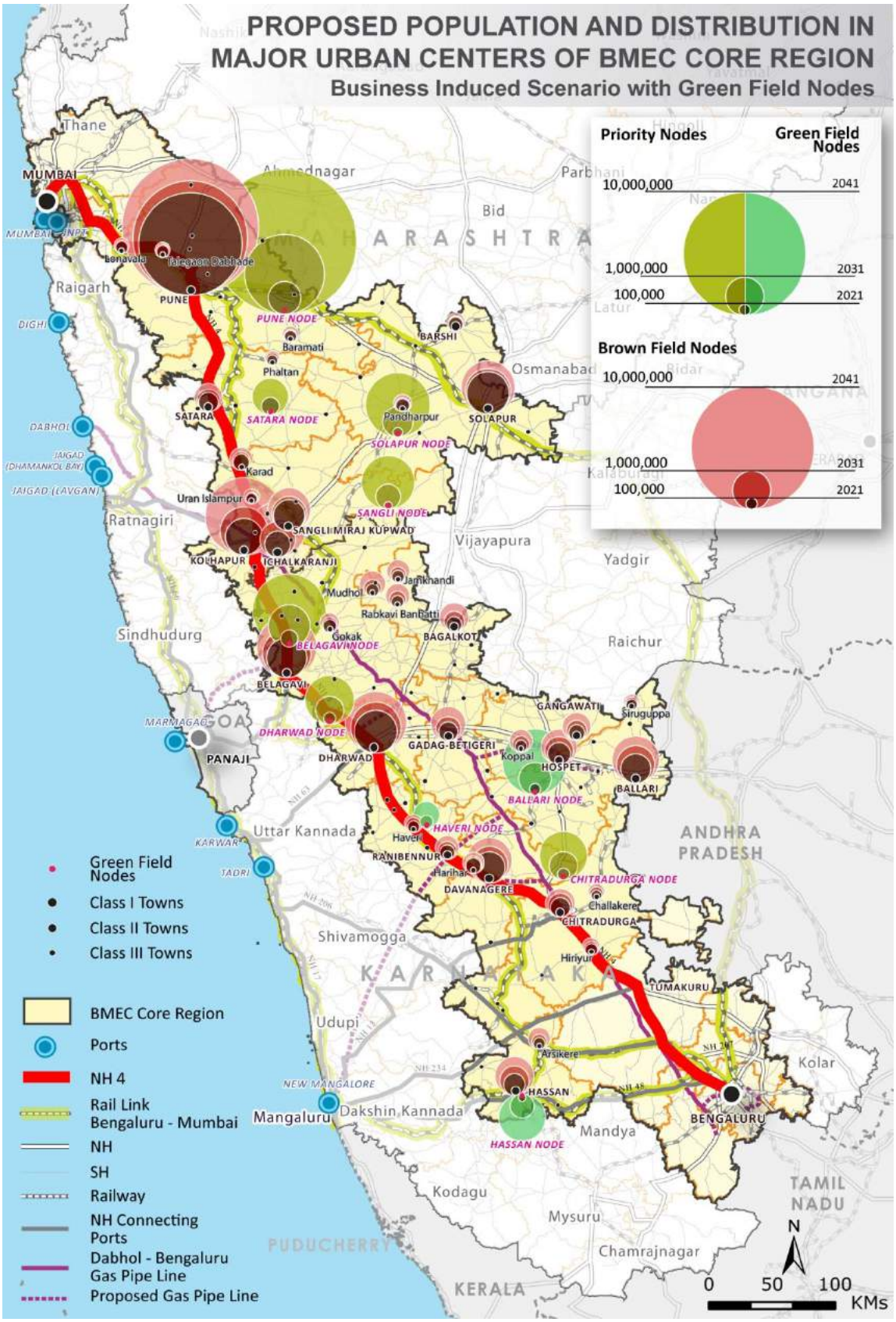
The Compound Annual Growth Rate of Urban population in BMEC core region is estimated to increase from 2.58 in BAU scenario to 5.6 in BIS scenario. The growth envisaged in Business Induced Scenario indicates rapid urbanization leading to excess stress on existing urban infrastructure and its carrying capacity.

Based on suitability matrix and subsequent selection criterion, 10 node locations were identified for the development of Industrial Node cum Mega city in BMEC Core Region. Out of this three Nodes in Karnataka and Four Nodes in Maharashtra *(although Pune & Satara were identified as the two priority nodes, the same is yet to be finalised, hence, as an interim measure, all four locations are considered as priority)* are identified as priority nodes and potential site locations for these priority nodes were also identified and the same was discussed in previous chapter. This priority Industrial Node cum Mega cities, Phase II Nodes and the rest of the BMEC Districts are expected to accommodate the additional population growth expected through BMEC's economic development.

The proposed 10 Greenfield Industrial Node Cum Mega cities (including 5 to 7 Priority Nodes) and its immediate surroundings are expected to accommodate a population of about 30.5 million by 2014, which accounts for 38.6% of total urban population in the BMEC core region by 2041. Based on this approach, population of about 49.1 million is expected to be accommodated in the existing urban centres(Brownfield Urban development), indicating a CAGR of 3.91 by 2041. Existing urban centres in the districts without Industrial Node will have higher CAGR as per estimated employment demand and its proportionate distribution based on current population.

The map below shows the distribution of urban population in BMEC core region by 2041 indicating as per the identified locations for Industrial node cum megacities.

Map: BIS scenario with Greenfield Nodes, BMEC



Source: Egis

15. Priority and Early Bird Projects of Identified Industrial Node cum Mega cities, BMEC Region

This chapter discusses the list of such **priority infrastructure projects which needs to be implemented in order to promote industrialisation, attract investors and facilitate successful functioning of the identified Node cum Mega City.** This list of priority projects is predominantly derived from the sectoral perspective plan discussed in the earlier chapter, along with additional infrastructure requirements of the Node. Further, this chapter also identifies a list of important projects which needs to be initiated on priority basis or to be taken up as **Early Bird Projects to achieve the establishment of the nodes** and its related growth benefits of the region. The projects to be carried out in priority are identified and categorised as:

1) **Regional Level Priority projects** :- those projects identified under various sectors, to enhance the overall development of BMEC region and which are expected to directly influence the establishment/ development of the Industrial Node are identified and listed under this category and

2) **Node Level Priority Project: Projects which are directly linked to the development of Node and are crucial for actual functioning of the node,** like external Infrastructure linkages, provision of water supply, establishment of direct site connectivity etc., are identified and listed under this category.

The following part of the chapter provides list of priority projects identified under the above-mentioned two categories for each of the five priority Industrial Nodes cum mega cities. The list provides a brief about each of the project, its estimated preliminary cost and the name of the government departments which are responsible for its implementation.

In case all the five nodes, as there is no ready availability of land with the government for development and as there is an immediate need to mobilise land as per finalised node sizes, **mobilisation of land for the node development by respective State Governments will remain as a major Priority cum Early Bird project for all the nodes**. This will be followed by **preparation of Master Plans for each of the proposed nodes, which will also remain as a major Priority cum Early Bird project for all the nodes**.

15.1 Belagavi Node: Vantamuri-Mastiholi-Managutti

As explained in the preceding chapters, the Node cum Mega City in Belagavi is located atVantamuri-Mastiholi-Managutti, of Hukeri sub-district (taluk).The following table gives a snap shot of the proposed node at Belagavi.

15.1.1 Snap Shot of Belagavi Node Perspective

Estimated total land demand for Node development by 2041	**32560 acres (130 sqkm)** Out of which industrial area is about 79 sq km (assuming 60% of the area under

	processing zone)
Node size finalized for Phase I development:	**11,000acres (44 sqkm)** Out of which industrial area is about 27 sq km, with a ratio of 60% processing and 40% non-processing area, which will fulfill industrial land demand of the node up to2032.
Land area already notified by KIADB within identified Node	4140 acres (16.75 sq km)

15.1.2 Priority project of Belagavi Node cum Megacity

As per the perspective plan projections, the Belagavi Node is expected to house some of the major industrial sectors like **Heavy Engineering, Defence, Aero Space, Automobile & Auto ancillary and expected to attract an investment of around 3280 million USD and create an export value of around 2100 million USD by 2032.** In order to facilitate the same, the following key infrastructure gaps of the region need to be addressed on priority:

1. **Port & Port Connectivity**
2. **Rail Infrastructure**
3. **Urban Infrastructure**
4. **Node based external infrastructure**
5. **Airport Infrastructure**

There are other infrastructure requirements, like need to enhance road transportation connectivity and the immediate node based infrastructure requirements like, Power & Water, which would also be part of the priority project. The following is the list of node level and regional level priority projects and early bird projects for the Belagavi node located in Vantamuri- Managutti area.

Table: Node Level and Regional Level Priority Projects, Belagavi Node (Vantamuri-Mastiholi-Managutti)

Sector	Sl. No.	Project Name	Project Category	Implementing Agency	Estimated Preliminary Project Cost & No. of Phasing
Node Level Priority Projects					
Industrial Infrastructure	1	Land Mobilisation: Notification & acquisition/ mobilisation of 44 to 130 sqkm of land within the earmarked for Node Development.	**Early Bird Project**	KIADB,GoK	INR. 10,00,000/- per acre, as per inputs provided by KIADB & Revenue department
	2	Preparation of Detailed Master Plan for Belagavi Industrial Node cum Mega city	**Early Bird Project**	SPV OF BMEC/ DMICDC,DIPP & GoK	
Water	3	Water Supply Infrastructure from Hidkal Reservoir (Ghataprabha) to the proposed Industrial Node *(PHASE I till 2022, is to be taken up as an Early Bird Project for the node)*	**Early Bird Project**	KIADB,GoK	Around INR 417 crores (in 2 Phases)
Roads	4	6 Lanning of Belagavi-Sankeshwar-Kolhapur NH4 *(96 km, from existing 4 lane, proposed as part of BMEC to enhance connectivity between Belagavi & Kolhapur)*	**Early Bird Project**	NHAI & GoK	Around INR 1011 crores
	5	Development of Outer Peripheral Ring Road at Belagavi City *(Expected to ease traffic movment along NH4 by bye-pasing the city, the project is already proposed by DULT connecting,Kakti- Sulga-Udyambag-Majagaon-Old PB Road-Kalkamb-Mutennati-Kakati, total length of 41.53 km)*	**Early Bird Project**	DULT,GoK	Around INR 986 crores
	6	Upgradation of MDR road connecting NH4 to Vantamuriland parcel from NH4 as per Master Plan *(Proposed as part of BMEC for Belagavi Node)*	Priority Project	PWD/KRDCL GoK	Around INR 165 crores
	7	Up gradation (4 laning) of SH 141 connecting the Belagavi node with Belagavi City *(around 24 kms,Proposed to have alternative connectivity to Belagavi Node)*	Priority Project	KRDCL	Around INR 360 crores
Rail	8	Rail connectivity between Belagavi Node (Vantamuri land) & Mumbai-Bengaluru Rail line from Pachhapur Railway station as per Master Plan *(around 37 km, Proposed as part of BMEC. would provide direct rail connectivity to Belagavi Node)*	Priority Project	MoR, GoI & GoK	Around INR 370 crores
Energy	9	Ghataprabha Hydel project 2X 10 MW *(Project proposed by KPCL, approved for implemenattion. Proposed as Early Bird Project as part of BMEC)*	**Early Bird Project**	Power Company of Karnataka Ltd. (KPCL),GoK	
	10	Dhabol- Bengaluru gas pipeline's Spur line from main trunk line *(Belagavi Node lies on spur line from Gokak to Mormugao, 46 KMs long Gokak - Belagavi spur line & additional length of around 20 to 25 km to the Node from the city is proposed. The Spur line is Proposed as part of Phase II development of Dhabol-Bengaluru gas pipeline and the same is proposed to be extended to the Belagavi Node as part of BMEC for Belagavi Node)*	Priority Project	GAIL, GoI	
	11	Development of gas based power plant of 700 MW in Belagavi district *(to be expanded to 2100 MW in later phases,already proposed by KPCL,GoK, also proposed as part of BMEC)*	Priority Project	Power Company of Karnataka Ltd. (KPCL),GoK	Around INR 3500 crores (as per govt. estimates)
Housing	12	Housing Development projects for a Housing demand of 49,322 in 2032 *(LIG: 43,561; EWS: 5761)*	Priority Project		around INR 3440 crores
Urban Transportation	13	Vantamuri - Belagavi City- Belagavi Airport connectivity Metro Rail *(around 9 Km, Proposed as part of BMEC for Belagavi Node)*	Priority Project	MoUD & DULT,GoK	Around INR 3150 crores

	14	Implementation of Intelligent Transportation System (ITS) for Public Transportation at Belagavi *(Proposed by DULT and project is in pre-feasibility stage. Proposed as part of BMEC for Belagavi Node)*	Priority Project		Around INR 110 crores
Regional Level Priority Projects					
TRANSPORT- RAIL	1	Hospete- Hubballi-Londa-Tinaighat-Vasco da Gama (Ballari - Vasco DFC) **(PORT CONNECTIVITY)** *Hospete-Tinaighat-Vasco da Gama (245 km,SW doubling work in progress) Tinaighat-Vasco da Gama (108 km, New Line Proposed) Hospete- Hubballi-Londa-Tinaighat which is funded by ADB in already under implementation. Tinaighat-Vasco da Gama is pending due to environmental clearances and would be implemented by SWR. Chennai-Goa DFC(double line) proposal by DFCL Proposed under is also planning same alignment till Hubballi and then to follow Hubballi -Ankola line)*	**Early Bird Project**	Dedicated Freight Corridor Corporation of India (DFCCIL) ,South Western Railways,Konkan Railways, MoR,GoI and GoK	Tinaighat-Vasco da Gama (around INR 1458 crores, 1 Phase)
	2	Davanagere - Hubballi *(144 km, Up gradation of Existing line to Double line with electrification, 144 km Proposed as part of Mumbai- Chennai, High Speed Rail Line by Indian Railways. Proposed as part of BMEC.)*	Priority Project	South Western Railways, MoR, GoI	Around INR 1512 crores
	3	Hubballi - Belagavi Direct line *(Proposed New Double Line*, 141 *km, SWR has already proposed for Single line upto Shawantwadi.Proposed as double line as part of BMEC corridor. Proposed as High Speed Rail Line by Railways.)*	Priority Project	South Western Railways, MoR, GoI	Around INR 1481 crores
	4	Belagavi - Sawantwadi-Redi Port (New Line) **(PORT CONNECTIVITY)** *(Project under consideration by SWR. Double lining of the entire stretch proposed under BMEC)*	**Early Bird Project**	South Western Railways, MoR,GoI	Around INR 1647crores (1 Phase)
	5	Hubballi- Ankola **(DFC Spur Line)** (*167 km, New Line Double Line electrified.* *This project would act as the main port connectivity link for Dharwad & Belagavi region, Project proposed and is in pre-feasibility stage. DFCL is already in the process of carrying out a PETS for double line DFC. SWR has also proposed & budgeted Single line connectivity, which is yet to be approved. Land to be provided free of cost by State Govt. Environmental Clearance of the project remains pending. Proposed as DFC spur line as part of BMEC as port connectivity to Mormugao Port, Karwar & proposed Tadri Port)*	Priority Project	Dedicated Freight Corridor Corporation of India (DFCCIL) ,South Western Railways, MoR,GoI and GoK	Around INR 3596crores (1 Phase)
	6	Belagavi- Miraj Upgradation (Double lining with electrification) *(Proposed as High Speed Rail Line by Indian Railways., proposed as part of BMEC as double line)*	Priority Project	South Western Railways, MoR, GoI	Around INR 1587crores (1 Phase)
	7	Belagavi – Sangli/Miraj**(DFC)** *(145 km, Proposed as part of Mumbai -Bengaluru- Chennai - Diamond Quadrilateral. Asingle line along the existing rail link is proposed as DFC as a part of BMEC)*	Priority Project	Dedicated Freight Corridor Corporation of India (DFCCIL) ,MoR, GoI	Around INR 3698crores (1 Phase)
	8	Davanagere - Hubballi - Belagavi - **(DFC)** *(285 km, Proposed as part of Mumbai -Bengaluru- Chennai - Diamond Quadrilateral.A single line along the existing rail link is proposed as DFC as a part of BMEC)*	Priority Project	Dedicated Freight Corridor Corporation of India (DFCCIL) ,MoR, GoI	Around INR 7268crores (1 Phase)
	9	Belagavi-Kalaburgi via Shahabad, Vijayapura & Shedbal*(New Line, Double line electrified, Proposed as Connectivity to Kalaburgi NIMZ, Proposed as part of BMEC. Connects Kalaburagi (NMIZ) to Belagavi (DFC) and connects to other western ports through Belagavi.)*	Priority Project	South Western Railways, MoR, GoI & GoK	Shahabad- Shedbal Stretch (around INR 350crores, 1 Phase)
	10	Bagalkot - Belagavi *(145 kms long New Line &Double line electrified, Proposed as part of BMEC to enhance connectivity between Ballari region to NMPT and also connects Chitradurga- Davanagere Node.)*	Priority Project	South Western Railways, MoR, GoI & GoK	Around INR 1958crores (1 Phase)
TRANSPORT-ROADS	11	Sankeshwar (NH-4) - Tita- Sawantwadi- Redi Port (around 130 Kms upgradation of SH 134, SH180, SH121 & SH120 into 4 L) **(PORT CONNECTIVITY)** *(Will facilitate development of both Belagavi & Kolhapur districts. Connects NH4 to NH17 and then to Redi Port. Total INR 1562 crores, Upgradation of 2 L to 4L in Phase 2.)*	**Early Bird Project**	MSRDC, GoM	Around INR 1562 crores (2 Phases)
	12	Belagavi-Panjim (NH4A) Upgradation to 4 lane **(PORT CONNECTIVITY)** *(Proposed as Early Bird Project under BMEC for Belagavi Node to Mormugao Port)*	**Early Bird Project**	National Highway Authority of India (NHAI), GoI & GoK	Around INR 1332 crores

	13	NH -63: Hubballi- Ankola Stretch **(PORT CONNECTIVITY)** *(Enhances connectivity between Ballari, Dharwad, Kopppal districts to Mormugao, Karwar & Tadri Ports)*	Priority Project	National Highway Authority of India (NHAI)	Around INR 1188 crores (1 Phase)
	14	SH 20: Belagavi – Salahalli *(80 km, Up gradation to 4L, Belagavi - BMEC Expressway, proposed as part of BMEC)*	Priority Project	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	Around INR 520 crores (1 Phase)
	15	6 laning of NH4 Stretch between Chitradurga- Haveri-Hubballi *(Upgradation from 4L to 6L ,NHAI is already preparing feasibility study,)*	Priority Project	National Highway Authority of India (NHAI)	Around INR 2257 crores
TRANSPORT- PORTS (nearest to node)	16	Redi Port: Enhancement of port capacity to 33 MTP *(Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand)*	**Early Bird Project**	Maharashtra Maritime Board & Earnest John Group of Companies	
	17	Tadri Port: Development of Greenfield Mega Port at Tadri (100 MTP capacity in two Phases) *Greenfield port proposal by GoK (approx cost of 3000 crores). Would also facilitate Belagavi Node and Ballari region. Mos is planning to develop a Greenfield Satellite Port for NMPT &Mormugao, Tadri can be considered for the same.*	Priority Project	KSIIDC & IDD, Ports and Inland Water Transport Department, GoK and MoS,GoI or can be taken up by BMEC SPV	Around INR 9000 crores (2 Phases)
TRANSPORT- AIRPORTS	18	Belagavi Airport (Upgradation to International Airport) *Expansion Underway*	Priority Project	Airports Authority of India (AAI) & IDD,GoK	Around INR 293.35 crores

15.2 Dharwad: Kittur-Dombarkuppa- Durgadakeri

As explained in the preceding chapters, the Node cum Mega City in Dharwad is located at Kittur-Dombarkuppa- Durgadakeri, located across Dharwad sub-district (taluk) and Sampagaon sub district (taluk) of Belagavi. The following table gives a snap shot of the proposed node at Dharwad.

15.2.1 Snap Shot of Dharwad Node Perspective

Estimated total land demand for Node development by 2041	**14585 acres (59 sq km)**Out of which industrial area is about 35 sq km (assuming 60% of the area under processing zone)
Node size finalized for Phase I development:	**9213 acres (37 sq km)** Out of which industrial area is about 22 sq km, with a ratio of 60% processing and 40% non-processing area, which will fulfill industrial land demand of the node up to2037.
Land area already notified by KIADB within identified Node	4349.4 acres (17.6 sq km)

15.2.2 Priority project of Dharwad Node cum Megacity

As per the perspective plan projections, the Dharwad Node is expected to house some of the major industrial sectors like **Heavy Engineering, Defence, Aero Space, Automobile & Auto ancillary and expected to attract an investment of around 3180 million USD and create an export value of around 1264 million USD by 2037.** In order to facilitate the same, the following key infrastructure gaps of the region need to be addressed on priority:

1. **Port and Port Connectivity**
2. **Node based infrastructure**
3. **Rail**
4. **Urban infrastructure**
5. **Airport**

There are other infrastructure requirements, like need to enhance road transportation connectivity and the immediate node based infrastructure requirements like, Power & Water, which would also be part of the priority project. The following is the list of node level and regional level priority projects and early bird projects for the Dharwad node located in Kittur-Dombarkuppa- Durgadakeri area.

Table: Node Level and Regional Level Priority Projects, Dharwad Node (Kittur-Dombarkuppa- Durgadakeri)

Sector	Sl.No.	Project Name and Details	Project Category	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & No. of Phasing
Node Level Priority Projects					
Industrial Infrastructure	1	Land Mobilisation: Notification & acquisition/ mobilisation of 35 to 59 sq km of land within the earmarked for Node Development.	**Early Bird Project**	KIADB, GoK	around INR. 10,00,000/- per acre, as per inputs provided by KIADB & Revenue department
	2	Preparation of Detailed Master Plan for Hubballi-Dharwad Industrial Node cum Mega city	**Early Bird Project**	SPV OF BMEC/ DMICDC,DIPP & GoK	
	3	Establishment of Tata Vendor Park at Belur:*(390 acres of land is already being mobilised by KIADB for establishment of the vendor park .Completion of this park will act as a major catalyst to attract auto & auto ancillary industry in the region.)*	**Early Bird Project**	KIADB,GoK & TATA Motors	
Water	4	Water Supply Infrastructure from Malaprabha (Renukasagara reservoir) or Hidkal to the proposed Industrial Node at Dharwad. *(PHASE 1 is to be taken up as an Early Bird Project for the node)*	**Early Bird Project**	KIADB,GoK	Around INR 587 crores / INR 794 crores (in 3 phases)
Roads	5	6 Laning of Hubballi-Dharwad NH4 Bye-Pass (30 km stretch): *(Currently this is an undivided two lane road and this is the major connectivity to the proposed node. Hence widening of this road should be taken up as an Early Bird Project.)*	**Early Bird Project**	NHAI & GoK	Around INR 390 crores
	6	Upgradation of SH 140 from SL to 2L+PS connecting NH 4 and SH 34 passing through the node, 16km (*This is a section of the alternate port connectivity from Dharwad node to Karwar and Belekeri ports)*	**Early Bird Project**	PWD/KRDCL GoK	Around 240 crores (in 2 Phses)
	7	Upgradation of road connecting NH 4(via Kotur- Belur Land parcel) and Tegur- Mandihal MDR from from SL to 4L, 8 km *(This will act as a connectivity bypassing NH 4 , between the Dharwad Node and Kotur Land Parcel)*	**Early Bird Project**	PWD/KRDCL GoK	Around 120 crores
	8	Road from NH 4 through Belur Industrial areas to road abuting Kotur land parcel (2km stretch new 4L to be developed, 3 km stretch within Belur IA to be upgraded from 2L to 4L), 5 km (*This will act as a connectivity bypassing NH 4 , between the Dharwad Node and other industrial areas including Belur Industrial area, Mummigatti , upcoming TATA vendor park etc. This road will facilitate these industrial areas to utilize the Logistic hub facility located in Dharwad Node)*	**Early Bird Project**	PWD/KRDCL GoK	Around 59 crores
	9	Development of new 4L road from proposed logistic hub to SH 140, 7 km *(This road will act as a continuation of the connectivity between NH 4 and SH 140 which is the proposed altenate port connectivity.)*	**Early Bird Project**	PWD/KRDCL GoK	Around 112 crores
Energy	10	Dhabol- Bengaluru gas pipeline's Spur line to the Belur Industrial Area, proposed Dharwad Node and Hubballi-Dharwad City- 65 KMs long Manoli- Dharwad spur line & additional length of around 20 to 25 km to the Node *(Proposed as part of Phase II development of Dhabol-Bengaluru gas pipeline and the same is proposed to be extended to the Dharwad Node as part of BMEC for Dharwad Node.)*	Priority Project	GAIL & KSIIDC, GoK	Around INR 100 crores(Costing to be confirmed with GAIL)
	11	Development of one Gas based power plant of 700 MW to meet the power demand of the node *(Proposed as part of BMEC)*	Priority Project	Karnataka Power Corporation Ltd. (KPCL)	Around INR 2450 crores (1 Phase)
Housing	12	Housing Development projects for Housing Demand of 41,099 in 2037 *(EWS: 4801; LIG: 36,299)*	Priority Project		around INR 2866 crores
Urban Transportation	13	Completion of Hubballi-Dharwad BRTS. *(Already under implementation by Hubballi- Dharwad BRTS Company, DULT,GoK. Identified as part of BMEC for Dharwad Node)*	Priority Project	DULT, GoK	Around INR 450 crores

	14	Project Planning of Durgadekeri-Belur-Dharwad- Hubballi City- Hubballi Airport connectivity (Metro Rail) *(Project planning has to be initiated on priority, in order to facilitate its completion within next 10 to 15 years i.e. by 2027-32)*	Priority Project	MoUD & DULT, GoK	Around INR 350 crores/km (approx.)
Regional Level Priority Projects					
TRANSPORT- RAIL	1	Hosapete- Hubballi-Londa-Tinaighat-Vasco da Gama (Ballari – Vasco rail connectivity & DFC via Hubballi) **(PORT CONNECTIVITY)** *Mormugao port is the only existing major in proximity to Dharwad Node. This will act as the main port for the ndoe till the establishment of Tasri or Haldipur ports. Hosapete-Tinaighat-Vasco da Gama (245 km,SW doubling work in progress) , Tinaighat-Vasco da Gama (108 km, New Line Proposed)* *(Hosapete- Hubballi-Londa-Tinaighat which is funded by ADB in already under implementation. Tinaighat-Vasco da Gama is pending due to environmental clearances and would be implemented by SWR. Chennai- Goa DFC(double line) proposal by DFCL , is also planning same alignment till Hubballi and then to follow Hubballi-Ankola line.)*	**Early Bird Project**	Dedicated Freight Corridor Corporation of India (DFCCIL) ,South Western Railways,Konkan Railways, MoR,GoI and GoK	Tinaighat-Vasco da Gama (around INR 1458 crores, 1 Phase)
	2	Hubballi- Ankola **(DFC Spur Line)***(167 km), New Line Double Line electrified* *(Project proposed and is in pre-feasibility stage./DFCL is already in the process of carrying out a PETS for double line DFC. SWR has also proposed & budgeted Single line connectivity, which is yet to be approved. Land to be provided free of cost by State Govt. Environmental Clearance of the project remains pending. Proposed as DFC spur line as part of BMEC as port connectivity to Mormugao Port, Karwar & proposed Tadri Port.)*	Priority Project	Dedicated Freight Corridor Corporation of India (DFCCIL) ,South Western Railways, MoR,GoI and GoK	Around INR 3596 crores (1 Phase)
	3	Davanagere - Hubballi - Belagavi - **(DFC)***285 km (Proposed as part of Mumbai -Bengaluru- Chennai - Diamond Quadrilateral, Proposed as DFC as part of BMEC)*	Priority Project	Dedicated Freight Corridor Corporation of India (DFCCIL) ,MoR, GoI	Around INR 7268 crores (1 Phase)
	4	Hubballi - Belagavi Direct line& Double lining & Electrification*(Proposed New Double Line, 141 km, SWR has already proposed for Single line up to Shawantwadi. Proposed as double line as part of BMEC corridor. Proposed as High Speed Rail Line by Railways.)*	Priority Project	South Western Railways, MoR, GoI	Around INR 1481 crores
	5	Davangere - Hubballi Double lining & Electrification *(would enhance connectivity towards Bengaluru & Davangere, 144 km,Up gradation of existing line to Double line with electrification, Proposed as part of Mumbai- Chennai, High Speed Rail Line by Indian Railways. Proposed as part of BMEC.)*	Priority Project	South Western Railways, MoR, GoI	Around INR 1512 crores
	6	Davangere- Shivamoga- Double lining with electrification *(This line act as an alternative route to proposed Haldipur & Tadri ports. New Line, 90 km,Proposed as single line by SWR. Doubling is proposed under BMEC.)*	Priority Project	South Western Railways, MoR, GoI	Around INR 1215 crores (1 Phase)
	7	Davanagere- Birur *(Up gradation)*- Kadur- Chikkamagaluruu- Sakaleshpur *(New Line , 250 km) - Double lining with electrification* *(This will enhance connectivity to NMPT port. Davanagere to Chikjajjur is proposed to be made double line electrified. Chikjajjur to Birur, which is already under implementation by SWR is proposed to be electrified (110 km) , Chitradurga to Chikjajjur Double lining(28 km) & Kadur- Chikkamagaluruu - Sakaleshpur new double line (102 Km, out of which 46 km long Kadur-Chikkamagaluruu of single line already completed, Chikkamagaluruu - Sakaleshpur work is in progress) . Land Provided State Govt)*	Priority Project	South Western Railways, MoR,GoI	INR 1377 crores (Kadur-Sakaleshpur) INR 1155 crores (Davangere - Kadur)
TRANSPORT-ROADS	8	NH -63: Hubballi- Ankola Stretch **(PORT CONNECTIVITY)** *(Proposed widening of NH63 to4 lane which enhance connectivity to Mormugao, Karwar & Tadri Ports)*	**Early Bird Project**	National Highway Authority of India (NHAI), GoI & GoK	Around INR 1188 crores (1 Phase)
	9	6 laning of NH4 Stretch between Chitradurga- Haveri-Hubballi *(This will enhance connectivity to Bengaluru & other BMEC districts. Upgradation from 4L to 6L,NHAI is already preparing feasibility study.)*	**Early Bird Project**	National Highway Authority of India (NHAI), GoI & GoK	Around INR 2257 crores
TRANSPORT- PORTS (nearest to node)	10	Tadri Port: Development of Greenfield Mega Port at Tadri (100 MTP capacity in two Phases) *Due to limitation to expand Karwar & Belekeri ports, there is need for a Greenfield port in close proximity to this region. Tadri & Haldipur are identified as potential locations by BMEC plan. This Greenfield port at Tadri is also a proposal by GoK would also facilitate Belagavi Node and Ballari region. Land is already acquired by GoK, Mos is planning to develop a Greenfield Satellite Port for NMPT &Mormugao, Tadri can be considered for the same.*	**Early Bird Project**	KSIIDC & IDD, Ports and Inland Water Transport Department, GoK and MoS,GoI or can be taken up by BMEC SPV	Around INR 9000 crores (2 Phases)

	11	Haldipur Port Greenfield Mega Port (100 MTP capacity in two Phases *(Greenfield port proposal by GoK. Proposed as part of BMEC. Mos is planning to develop a Greenfield Satellite Port for NMPT & Mormugao, Haldipurcan is considered for the same).*	Priority Project	KSIIDC & IDD, Ports and Inland Water Transport Department, GoK and MoS,GoI or can be taken up by BMEC SPV	Around INR 9000 crores (2 Phases)
	12	Expansion of Karwar port to 30 MTP, *(Proposed as part of BMEC. GoK has also proposed to expand Karwar port. To facilitate Dharwad, Belagavi & Ballari nodes)*	Priority Project	KSIIDC, IDD, Ports and Inland Water Transport Department, GoK and MoS,GoI	Around INR 2097 crores (1 Phase)
TRANSPORT-AIRPORTS	13	Upgradation of Hubballi Airport to International Airport. *(The AAI will expand it into an all-weather airport. GoK has mobilised land for the same. Currently work is under progress. BMEC has proposed to develop it as an International Airport to facilitate the node development)*	Priority Project	Airports Authority of India (AAI) & IDD,GoK	Around INR 160 crores (estimated by AAI)

15.3 Chithradurga- Davanagere: Chikkagondanahalli- Sangenahalli- Donnehalli

As explained in the preceding chapters, the Node cum Mega City in Chitradurga – Davanagere districtis located in Chikkagondanahalli- Sangenahalli- Donnehalli area (Chikkagondanahalli of Chitradurga Taluk of Chitradurga district and Sangenahalli- Donnehalli of Jagalur Taluk of Davanagere district). The following table gives a snap shot of the proposed node at Belagavi.

15.3.1 Snap Shot of Chitradurga- Davanagere Node Perspective

Estimated total land demand for Node development by 2041	**15554 acres (62.8 sq km)**Out of which industrial area is about 38 sq km.(assuming 60% of the area under processing zone)
Node size finalized for Phase I development:	**9870 acres (40 sq km)**Out of which industrial area is about 24 sq km, with a ratio of 60% processing and 40% non-processing area, which will fulfill industrial land demand of the node up to2037.
Land area already notified by KIADB within identified Node	There is no land notified within this identified area , for acquisition and the entire parcel has to be freshly notified & acquired

15.3.2 Priority project of Chitradurga- Davanagere Node cum Megacity

As per the perspective plan projections, the Chitradurga- Davanagere Node is expected to house some of the major industrial sectors like **Agro processing, Neutraceuticals, Textiles and Aerospace and Defence and expected to attract an investment of around 2964 million USD and create an export value of around 2290 million USD by 2037.** In order to facilitate the same, the following key infrastructure gaps of the region need to be addressed on priority:

1. **Lack of Water in the region**
2. **Site Connectivity**
3. **Urban Infrastructure**
4. **Port and Port Connectivity**

Table: Node Level and Regional Level Priority Projects, Chithradurga-Davanagere Node (Chikkagondanahalli- Sangenahalli-Donnehalli)

Sector	Sl.No	Project Name and Details	Project Category	Implementing Agency	Estimated Preliminary Project Cost & No. of Phasing
Node Level Priority Projects					
Industrial Infrastructure	1	Land Mobilisation: Notification & acquisition/ mobilisation of 40 sqkm of land within the earmarked for Node Development.	**Early Bird Project**	KIADB,GoK	INR. 3,00,000/- per acre, as per inputs provided by KIADB & Revenue department
	2	Preparation of Detailed Master Plan for CHITRADURGA- DAVANAGERE Industrial Node cum Mega city	**Early Bird Project**	SPV OF BMEC/ DMICDC,DIPP & GoK	
Water	3	Water Supply Infrastructure from Tungabhadra Reservoir / Bhadra/ Vanivila Sagar reservoir to proposed Industrial Node *(90/ 120/70km, PHASE 1 is to be taken up as an Early Bird Project for the node)*	**Early Bird Project**	KIADB,GoK	Around INR 1037/ 1217/ 841 crores (in 3 phases)
Roads	4	4 Lanning of 120 KM long Chitradurga-Hospet NH13 *This primary connectivity to the node and connects to Chitradurga & NH4 and to Hospet and Solapur. This road needs to be upgraded from existing 2 lane. Already proposed & budgeted under NHAI.*	**Early Bird Project**	NHAI & GoK	Around INR 1034 crores
	5	4 Lanning of 58 KM long Davanagere-Donnehalli SH 65 connectivity to site. *This road is another major connectivity to the node connecting it to Davanagere city and NH4. This SH needs to be enhanced to 4 lane connectivity. Proposed as part of BMEC.*	**Early Bird Project**	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	Around INR 669 crores
Rail	6	Developing rail connectivity & siding for the node connecting to Chithradurga- Ballari Rail link- *22km long, rail link, which connect the node directly to the main Chitradurga- Ballari existing rail link.*	Priority Project	MoR, GoI & GoK	Around INR 220 crores
Urban Transportation	7	Up gradation of SH 45 and MDR connectivity from Chitradurga Node to SH 19- 30 km *Connectivity to Ballari airport), 14 km to 4L.Proposed as part of BMEC*	Priority Project	KRDCL, GoK	Around INR 350 crores (2 Phases)
Energy	10	Dabhol- Bengaluru gas pipeline's Spur line from main trunk line *(Node lies close to existing alignment, just around 5 to 6 km away, direct connectivity will attract Gas based industries and would facilitate establishment of gas based captive power plant within the node.)*	Priority Project	GAIL,GoK	Around INR 10crores *(cost to be confirmed with GAIL)*
	11	Development of gas based power plant of 700 MW at Davanagere district *(to be expanded to 2100 MW in later phases, already proposed by GoK, also proposed as part of BMEC to facilitate the node development)*	Priority Project	Karnataka Power Corporation Ltd. (KPCL)	INR 3500 crores (as per govt. estimates)
Housing	12	Housing Development projects for Housing Demand of 39,805 in 2037 *(EWS: 4649 ; LIG: 35,156)*	Priority Project		INR 2776 crores
Regional Level Priority Projects					
TRANSPORT- RAIL	1	Davanagere- Birur *(Up gradation)*- Kadur- Chikmagaluru- Sakaleshpur *(New Line , 250 km)* - *Double lining with electrification.***(PORT CONNECTIVITY)** *(This line would establish direct rail connectivity to NMPT port from both Davanagere & Chitradurga. Davanagere to Chikjajjur is proposed to be made double line electrified. Chikjajjur to Birur, which is already under implementation by SWR is proposed to be electrified (110 km) , Chitradurga to Chikjajjur double lining(28 km) & Kadur- Chikmagaluru - Sakaleshpur new double line (102 Km, out of which 46 km long Kadur-Chikmagaluru of single line already completed, Chikmagaluru - Sakaleshpur work is in progress) . Land Provided by State Govt)*	**Early Bird Project**	South Western Railways, MoR,GoI	INR 1377 crores (Kadur-Sakaleshpur) INR 1155 crores (Davangere - Kadur) (1 Phase)

	2	Tumakuru-Chitradurga-Davanagere *(This will be the direct & shortest rail connectivity from Bengaluru to Chitradurga & Davanagere via Tumakuru. Currently, the Bengaluru-Mumbai line is a longer route & does not connect Chitradurga. Hence this proposal is very crucial for the node. 256 km long new line, proposed as double lining with electrification, Single line is proposed under SWR. GoK to provide land. Double line with electrification is proposed as Early Bird Project for Chitradurga- Davanagere Node under BMEC.)*	**Early Bird Project**	South Western Railways, MoR,GoI	INR 2688 crores (1 Phase)
	3	Chitradurga-Challakere-Molakalmuru-Rayadurga-Ballari.152 km long upgradation of single line to double line. *(Proposed as part of BMEC to enhance connectivity between the node and Ballari region and would also act as Airport connectivity)*	Priority Project	South Western Railways, MoR,GoI	INR 1596 crores (1 Phase)
	4	Tumakuru-Chitradurga-Davanagere- **(DFC)** *(256 km Proposed as part of Mumbai -Bengaluru- Chennai - Diamond Quadrilateral, Proposed as DFC as a part of BMEC)*	Priority Project	DFCCIL ,MoR, GoI	INR 3596 crores (1 Phase)
	5	Tumakuru-Arsikere-Birur-Shivamogga-Thalaguppa- Honnavar.**(PORT CONNECTIVITY)** *(294 km, Arsikere to Devanur is already double line. BMEC proposes the entire stretch to be double line and electrified. Will connect Tumakuru NIMZ & Chitradurga- Davangere Node to the proposed Tadri Port, Halidipur Port via Thalaguppa & Honnavar. Thalaguppa- Honnavar section is a new line proposed by SWR. double lining is proposed under BMEC)*	Priority Project	South Western Railways, MoR,GoI	INR 1586 crores (Birur Shivamogga Thalaguppa upgradation) INR 999 crores (Thalaguppa Honnavar new line) (1 Phase)
TRANSPORT-ROADS	6	4 lanning of NH 13 from Chitradurga to Mangaluru Port via Bhadravati *(313 km)* **(PORT CONNECTIVITY)** *Proposed as Early Bird Project under BMEC to NMPT Port*	**Early Bird Project**	National Highway Authority of India (NHAI), GoI & GoK	Around INR 2817 crores (1 Phase)
	7	SH 19: Challakere - Ballari (AIRPORT CONNECTIVTY) *(Project is under MoRTH, and also proposed as part of BMEC)*	**Early Bird Project**	National Highway Authority of India (NHAI), GoI & GoK	Around INR 670 crores (1 Phase)
	8	NH -206: Tumakuru- Honnavar Port *(373 km, Up gradation from 2L to 4L)* **(PORT CONNECTIVITY)** *Proposed as part of BMEC, connectivity of Chitradurga Node & Tumakuru NIMZ to proposed Tadri Port/ Haldipur Ports*	Priority Project	National Highway Authority of India (NHAI), GoI & GoK	NHAI (1 Phase)
	9	6 laning of NH4 Stretch between Chitradurga- Haveri-Hubballi *(Upgradation from 4L to 6L, NHAI is already preparing feasibility study, proposed as part of BMEC. This enhance connectivity between the node and other parts & nodes of BMEC region)*	Priority Project	National Highway Authority of India (NHAI), GoI & GoK	Around INR 2257 crores
	10	SH 2: Haveri- Yekambi (54 km), SH 69: Yekambi- Kumta/ Belekere (73 km) **(PORT CONNECTIVITY)** *(Upgradation to 4 lane to enhance connectivity to proposed Tadri &Haldipur ports and other west coast ports. This will act as an alternative route to NH 206., Proposed as part of BMEC)*	Priority Project	KRDCL,GoK	Around INR 1451 crores (2 Phases)
TRANSPORT- PORTS (nearest to node)	11	NMPT: Additional capacity of 50 MTP *(With development of NMIZ Tumakuru and proposed Chitradurga Node, there is demand to immediately expand the capacity of NMPT port. Hence identified as eraly bird project for Chitradurga Node.)*	**Early Bird Project**	Ministry of Shipping, GoI	INR 4500 crores (1 Phase)
	12	Tadri Port: Development of Greenfield Mega Port at Tadri (100 MTP capacity in two Phases) *Development of Tadri port would not only facilitate the Nodes of Dharwad, Belagavi & Ballari region, but it would also facilitate the Chitradurga-Davanagere node. With the proposed connectivity enhancement through Talaguppa- Honnavar Rail link and NH206 upgradation, Tadri port will be nearest port to Chitradurga node. Hence development of this port is one of the priority projects. Its already being proposed as a Greenfield port by GoK. Mos is planning to develop a Greenfield Satellite Port for NMPT & Mormugao,*	Priority Project	KSIIDC & IDD, Ports and Inland Water Transport Department, GoK and MoS,GoI or can be taken up by BMEC SPV	INR 9000 crores (2 Phases)
TRANSPORT-AIRPORTS	13	Development of Greenfield Airport at Shivamogga. *Project was already initiated through PPP mode by GoK. Development of this airport will facilitate the node*	Priority Project	Airports Authority of India (AAI) & IDD,GoK	INR 194 crores

15.4 Pune: Bhor/ Indapur

As explained in the preceding chapters, the Node cum Mega City in Pune is located in Bhor/ Indapur area and the Indapur Node is located on NH 9 at Indapur Taluk & the Bhor Node is located on NH4 in Bhor Taluk. The following table gives a snap shot of the proposed node at Pune.

15.4.1 Snap Shot of Pune Node Perspective

Estimated total land demand for Node development by 2041	**57822.7 acres (234 sq km)** Out of which industrial area is about 140.8 sq km. (assuming 60% of the area under processing zone).
Node size finalized for Phase I development:	**17791.6 acres (72 sq km)** Out of which industrial area is about 43 sq km, with a ratio of 60% processing and 40% non-processing area, which will fulfill industrial land demand of the node up to 2032.

15.4.2 Priority project of Pune Node cum Megacity

As per the perspective plan projections, the Pune Node is expected **to attract an investment of around 8300 million USD and create an export value of around 6300 million USD by 2037.** In order to facilitate the same, the following key infrastructure gaps of the region need to be addressed on priority:

1. **Port Connectivity**
2. **Transport Connectivity:**
3. **Water**
4. **Urban Infrastructure**

Although, only one of the locations (i.e. either Bhor or Indapur) will be finalised to locate the Industrial Node cum Mega city in Pune district, the priority project list is prepared considering both the locations and would be updated based on finalised node location. The list of priority & eraly bird projects under each sector are provided in the following table:

Table: Node Level and Regional Level Priority Projects, Pune Node (Bhor and Indapur)

Sector	Sl. No.	Project Name and Details	Project Category	Implementing Agency	Estimated Preliminary Project Cost (in crores)& No. of Phasing
Node Level Priority Projects					
Industrial Infrastructure	1	Land Mobilisation: Notification & acquisition/ mobilisation of 72 sqkm of land within the earmarked for Node Development.	**Early Bird Project**	MIDC, GoM	around INR 13 to 15 lakhs per acre
	2	Preparation of Detailed Master Plan for Pune Industrial Node cum Mega city	**Early Bird Project**	SPV OF BMEC/ DMICDC,DIPP & GoM	
Water	3	Water Supply Infrastructure from Ujjaini (Bhigwan reservoir)(5 km)/ Nira River (40km) to proposed Industrial Node in Indapur *Provision of water supply to the proposed node is one major infrastructure requirement for the node and the same is identified as a early bird project for Pune node.*	**Early Bird Project**	MIDC, GoM	Around 777.03- 1371.39crores
	3	(or)Water Supply Infrastructure from Shivsagar Reservoir (45km)/ Bhatghar Reservoir (5km) to proposed Industrial Node in Pune (Bhor) *Provision of water supply to the proposed node is one major infrastructure requirement for the node and the same is identified as a early bird project for Pune node.*	**Early Bird Project**	MIDC, GoM	around INR 1835 /817 crores (in 3 Phases)
Roads	4	Pune Ring Road *(161 km, 6L with service roads on both sides is already proposed by MSRDC and approved by GoM. This is one of the major infrastructure requirements for establishment of Pune node and hence identified as Early Bird Project as part of BMEC for Pune Node.)*	**Early Bird Project**	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 10400 crores
Rail	5	Baramati-Lonand-Shirwal-Mahad-Dighi line passing along Bhor node (will facilitate both Indapur & Bhor) *(Baramati - Lonanad section, single line, is already under implementation by CR. and connectivity between Roha (Konkan Line) and Dighi port is already sanctioned by MoR and would be implemented through SPV between MoR, MMB & Dighi Port. Remaining stretch is proposed as part of BMEC perspective Plan.)*	Priority Project	Central Railways, MoR,GoI	around INR 3275 crores (1 Phase)
Energy	6	Spur line of Gas pipeline to Bhor from proposed Kolhapur- Satara Trunk line. *(proposed as part of BMEC)*	Priority Project	GAIL, GoI	
	7	Development of 0.5 UMPP of 4000 MW Capacity *(Proposed as part of BMEC, The industrial power demand of the node is expected to be around 1994 MW by 2041)*	Priority Project	Maharashtra State Power Generation Company, GoM	around INR 13,000 crores (4 Phases)
	8	Development of solar power plant of 200 MW *(Proposed as part of BMEC, The industrial power demand of the node is expected to be around 230 MW by 2027)*	**Early Bird Project**	Maharashtra State Power Generation Company, GoM	around INR 1380 crores (2 Phases)
Housing	9	Housing Development projects for Housing Demand of 1,80,069 in 2032 *(EWS: 21033 , LIG: 1,59036)*	Priority Project		Around INR 12559 crores
Regional Level Priority Projects					
TRANSPORT- RAIL	1	Miraj-Pune double lining and electrification; *Upgradation of 240 km existing line to be electrified double line Proposed as High Speed Rail Line by Railways*	**Early Bird Project**	Central Railways, MoR,GoI	around INR 2520 crores (1 Phase)
	2	Sangli- Satara-Pune *272 km* **(DFC) :** *This project will enhance connectivity between Bengaluru & Mumbai and all the proposed industrial nodes along the corridor. Proposed as part of Diamond Quadrilateral. And the same is identified as priority project as part of BMEC*	Priority Project	Dedicated Freight Corridor Corporation of India (DFCCIL), MoR, GoI	Around INR 6937 crores (1 Phase)

TRANSPORT-ROADS	3	6 laning of NH4 stretch between Kolhapur- Satara- Pune, *223 km, Proposed as part of BMEC and would facilitate development of Kolhapur, Satara and Pune Node and its connectivity to other nodes of the region and spur lines to ports.*	Priority Project	National Highway Authority of India (NHAI), GoI	Around INR 2343 crores
	4	NH 9: Solapur- Kurkumbh- Pune, *260 km (Upgradation from 4L to 6L, Improves connectivity between Solapur Node, Pune node, Mumbai and ports of western coast of Maharashtra . It would also facilitate proposed Bidar NIMZ .*	Priority Project	National Highway Authority of India (NHAI), GoI	Around INR 2730 crores
	5	Shirwal- Mahad- Dighi Port Road enhancement: SH 70 : Shindewadi (NH-4) - Pandharpur Fata , *108 km (Upgradation to 4L)* , Pandharpur Fata - Gava Tala (SH-99), *14 km (Upgradation to 4L)* , SH 99 & MDR : Gava Tala - Dighi port, *53 km(Upgradation to 4L), 1st Phase proposed as Early Bird project as part of BMEC for Pune Node & Pune City to improve connectivity from Shindewadi on NH 4 to Dighi Port.*	**Early Bird Project**	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	Around INR 1936 crores (2 Phases)
TRANSPORT-TUNNELS	6	Bored Tunnel in Varandha Ghat,*(around 1km as per preliminary assessments), 2L, Located on the Shirwal- Mahad- Dighi Line., Integrated Tunnel, proposed as part of BMEC)*	Priority Project	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	Around INR 160 crores
TRANSPORT- PORTS (nearest to node)	7	Expansion of Dighi Port to 90 MT Capacity *(30 MT in Phase 1, 60 MT in Phase 2 and 90 MT in Phase 3) Expansion/ Capacity addition was already planned by the port management and the same is expected to meet BMEC's demand*	Priority Project	MMB and Balaji Group	Around INR 1200 crores (Phase 1), INR 3500-4000 crores (Phase 2)
TRANSPORT-AIRPORTS	8	New Pune International Airport*(The existing city, industrial development & the proposed node, demands a world class International Airport at Pune, which is currently depending on Mumbai Airport. This project is already proposed by GoM &would be located along Pune- Nashik NH 50 , near Rajgurunagar. Spread across 1800 hectares. Prioritisation of implementation of this project would be an important component)*	Priority Project	Airports Authority of India (AAI)	around INR 1000 crores

15.5 Satara: Man- Khatav

The proposed Node cum Mega City in Satara is located in Man- Khatav area and spreads across Man and Khatav taluks of Satara. The following table gives a snap shot of the proposed node at Satara.

15.5.1 Snap Shot of Satara Node Perspective

Estimated total land demand for Node development by 2041	**10828.2acres (44 sq km)** Out of which industrial area is about 26.3 sqkm
Node size finalized for development:	**9740.5 acres (39.4 sq km)** Out of which industrial area is about 23.64 sqkmwith a ratio of 60% processing and 40% non-processing area, which will fulfill industrial land demand of the node up to2041.

15.5.2 Priority project of Satara Node cum Megacity

As per the perspective plan projections, the Satara Node is expected **to attract an investment of around 3830 million USD and create an export value of around 3600 million USD by 2041.** In order to facilitate the same, the following key infrastructure gaps of the region need to be addressed on priority:

1. **Water**
2. **Port Connectivity**
3. **Transport Connectivity**

The list of priority & eraly bird projects under each sector are provided in the following table:

Table: Node Level and Regional Level Priority Projects, Satara Node

Sector	Sl. No.	Project Name	Project Category	Implementing Agency	Estimated Preliminary Project Cost (in crores)& No. of Phasing
Node Level Priority Projects					
Industrial Infrastructure	1	Land Mobilisation: Notification & acquisition/ mobilisation of 39.4 sq km of land within the earmarked for Node Development.	**Early Bird Project**	MIDC, GoM	around INR 8 to 10 lakhs per acre
	2	Preparation of Detailed Master Plan for Satara Industrial Node cum Mega city	**Early Bird Project**	SPV OF BMEC/ DMICDC,DIPP & GoM	
Water	3	Water Supply Infrastructure from Shivsagar Reservoir to proposed Industrial Node (Man- Khatav/ Koregaon) in Satara *(Establishment of 70kms/ 50 km long water supply infrastructure to the node)*	**Early Bird Project**	MIDC, GoM	around INR 1357/1088 crores
Roads	4	SH 58: Satara - Mhaswad *(Upgradation to 4L, 83km, proposed as Early Bird Project as part of BMEC for Satara Node. This road will connect the node to NH4 towards the west and proposed Expressway towards east..)*	**Early Bird Project**	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	Around INR 997 crores (2 Phases)
	5	Upgradation of Karad - Vaduj- Pingali Road *(This road is proposed to connect the node to Karad - Chiplun SH 78 which is the prime Port Connectivity for the node. It will also act as Airport Connectivity to Karad Airport)*	**Early Bird Project**	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	Around INR 477 crores (1 Phase)
	6	Upgradation of SH 146 (Pusegaon- Vaduj Road) passing through node *(Proposed as Early Bird Project as part of BMEC for Satara Node)*	**Early Bird Project**	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 176 crores (1 Phase)
Urban Transportation	7	Upgradation of Dahiwadi- Phaltan Road to Phaltan Airport from Satara Node *(Proposed to be upgraded as 2L, 45 km, 1st Phase proposed as Early Bird Project as part of BMEC project for Satara Node, to improve connectivity to Phaltan airport*	Priority Project	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 248 crores (2 Phases)
Rail	8	Developing rail siding for the node connecting to Bangalore-Pune DFC *(Provision of rasil link to the node from existing rail line, identified as priority project for Satara Node)*	Priority Project	Central Railways, MoR,GoI	INR 10 crores /Km (1 Phase)
Energy	9	Developing 1 Gas power plant of 700 MW *(Proposed as part of BMEC, the node would have a power demand of 412 MW by 2041)*	Priority Project	Mahagenco, GoM	around INR 2450 crores (3 Phases)
Housing	10	Housing Development projects for Housing Demand of 34,756 in 2041 *(EWS: 4056, LIG: 30,337)*	Priority Project		around INR 2424 crores
Regional Level Priority Projects					
TRANSPORT- RAIL	1	Miraj-Pune double lining and electrification; *(Upgradation of 240 km existing line to be electrified double line , Proposed as High Speed Rail Line by Railways, also identified as eraly bird project under Pune node)*	**Early Bird Project**	Central Railways, MoR,GoI	around INR 2520 crores (1 Phase)
	2	Sangli- Satara-Pune *272 km* **(DFC)** *This project will enhance connectivity between Bengaluru & Mumbai and all the proposed industrial nodes along the corridor. Proposed as part of Diamond Quadrilateral. And the same is identified as priority projects as part of BMEC. also identified as eraly bird project under Pune node)*	Priority Project	Dedicated Freight Corridor Corporation of India (DFCCIL), MoR, GoI	Around INR 6937 crores (1 Phase)
	3	Karad-Chiplun- Jaigad port 160 km, New Line Double line electrified **(DFC spur Line) (Port Connectivity)** *(Connects Bengaluru- Mumbai rail link to Konkan line and then to ports. Konkan line (Digini to Jaigad Port link) is already sanctioned by MoR & being implemented through an SPV formed between MoR, MMB & JAIGAD PORT)*	**Early Bird Project**	Central Railways, MoR,GoI	around INR 2160 (additional 720 crores for Tunnel + 40 crores for Bridge) (1 Phase)
TRANSPORT-ROADS	4	Karad-Chiplun-Jaigad Port road enhancement**(Port Connectivity)**SH-78: Karad - Chiplun, *90 km (Upgradation to 4L)* , SH-78: Chiplun - Modka Agar,*42 km(Upgradation to 2L)* ,	**Early Bird Project**	Maharashtra State Road Development Corporation Ltd.	Around INR 1543 crores

		SH- 4: Modka Agar - Dabhol Port & Jaigad Ports, *19 km (Upgradation to 2L)* *To improve connectivity to Dabhol and Jaigad Ports from Karad on NH 4, proposed as part of BMEC)*		(MSRDC), GoM	(2 Phases)
	5	6 laning of NH4 stretch Kolhapur- Satara- Pune, *223 km, Proposed as part of BMEC and would facilitate development of Kolhapur, Satara and Pune Node and its connectivity to other nodes of the region and spur lines to ports.*	Priority Project	National Highway Authority of India (NHAI), GoI	Around INR 2343 crores
TRANSPORT- PORTS (nearest to node)	6	Expansion of Dabhol Port to 10 MT, *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand*	Priority Project	MMB and RGPPL	Cost to be confirmed with port management
	7	Expansion of Jaigad Port (Dhamankhol Bay) to 50 MT *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand*	Priority Project	MMB and Jindal Group (JSW)	Cost to be confirmed with port management
	8	Development of Jaigad Port (Lavgan) (5MT) *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand*	Priority Project	MMB and Chowgule Group	around INR 1000 crores
TRANSPORT- AIRPORTS	9	Upgradation of Karad Airport *Already proposed by MADC and the same was identified as part of BMEC to facilitate Sangli & Satara Nodes and logistic hub at Karad*	Priority Project	Maharashtra Airport development Company (MADC)	cost to confirmed by MADC
	10	Upgradation of Phaltan Airport *Already proposed by MADC and the same was identified as part of BMEC to facilitate Sangli & Satara Nodes and logistic hub at Karad*	Priority Project	Maharashtra Airport development Company (MADC)	cost to confirmed by MADC

15.6 Solapur Node: Mandrup

The proposed Node cum Mega City is located in Solapur South Taluk, Solapur District. The following table gives a snap shot of the proposed node at Solapur.

15.6.1 Snap Shot of Solapur Node Perspective

Estimated total land demand for Node development by 2041	24,466 acres (99 sqkm) Out of which industrial area is about 59 sqkm
Node size finalized for development:	**11,390acres (46 sqkm) Out of which industrial area is about 28 sqkm** with a ratio of 60% processing and 40% non-processing area, which will fulfill industrial land demand of the node up to2041.

Source: Egis

15.6.2 Priority project of Solapur Node cum Megacity

As per the perspective plan projections, the Satara Node is expected **to attract an investment of around 2993 (6431) million USD and create an export value of around 3118 (6697) million USD by 2037(2041).** In order to facilitate the same, the following are the priority projects to be taken up for the node.

Table: Node Level and Regional Level Priority Projects, Solapur Node

Sector	Sl. No.	Project Name	Project Category	Implementing Agency	Estimated Preliminary Project Cost (in crores)& No. of Phasing
Node Level Priority Projects					
Industrial Infrastructure	1	Land Mobilisation: Notification & acquisition/ mobilisation of 46 sq km of land within the earmarked for Node Development.	Priority Project	MIDC, GoM	Around INR 1346 crores (in 2 phases)
	2	Preparation of Detailed Master Plan for Solapur Industrial Node cum Mega city	Priority Project	SPV OF BMEC/ DMICDC,DIPP & GoM	
Water	3	Water Supply Infrastructure from Ujjani Reservoir / Bheema River to the proposed Industrial Node at Solapur at Mandrup *(Establishment of 96 km/5km long water supply infrastructure to the node)*	Priority Project		Around INR 1525/ 512 crores (in 3 phases)
Rail	4	Rail connectivity between Solapur Node at Mandrup & Pune- Kalaburgi Rail line from Solapur Railway station, 12 km	Priority Project	Central Railways, MoR,GoI	Around INR 120 crores (INR 10 crores /km)
Energy	5	Extension of spur line (from Dabhol- Bengaluru gas trunk line)from Sangli to Solapur Node,145 km	Priority Project	GAIL, GoI	Around INR 580 crores(INR 4 crore/km)
Housing	6	Housing Development projects for Housing Demand of 1,03,120 in 2041 *(EWS: 12,045, LIG: 91,075)*	Priority Project		Around INR 7192 crores
Regional Level Priority Projects					
TRANSPORT- RAIL	1	Kolhapur-Miraj-Sangole-Pandharpur-Kurduvadi, 235 km, Upgradation to electrified double line *Proposed as part of BMEC. Improves connectivity of Sangli and Solapur Nodes with Bangalore Pune DFC*	Priority Project	Central Railways, MoR,GoI	around INR 2468
	2	Daund (Kurukumbh) - Solapur-Kalaburagi, 300 km, Upgradation to electrified double line *Proposed as part of BMEC to improve connectivity to Kalaburgi NIMZ from Bangalore Pune DFC*	Priority Project	South Western Railways, CR Railways, MoR, GoI	around INR 1395
TRANSPORT-ROADS	3	Proposed Greenfield Expressway : Sira (Tumkur/ Bengaluru)- Bigwan (Pune) (169 km, Phase 1 – 4Lane with 6L ROW. Starts by 2017 & opens by 2022 (Phase II-6 Lane) *Proposed as part of BMEC to enhance and establish high speed road transport connectivity between Bengaluru to Mumbai via Pune and other proposed Nodes of the region and to ease the forecasted traffic pressure on NH4 by 2020-25. Proposed with a design speed of 120 kms/ hr with access controls*.	Priority Project	NHAI, MoRTH, GoI & Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 3120 crores
	4	NH 204/ SH 3: Kolhapur-Sangli-Kamalapur (130 km, Upgradation from 2L to 4L)	Priority Project	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 1170
		Kamalapur-Sangola (8 km, existing 4L)			
		Sangola - Ghatne (NH-9) (70 km, Upgradation from 2L to 4L)			around INR 630
	5	NH 9: Solapur- Kurkumbh- Pune, 260 km (Upgradation from 4L to 6L) *Proposed as part of BMEC for Solapur Node. Improves connectivity between the Node and NH 4 through Solapur ,Pune Node, Mumbai and connects to ports of western coast of Maharashtra.*	**Early Bird Project**	National Highway Authority of India (NHAI), GoI	around INR 2730 crores
TRANSPORT- PORTS (nearest to node)	6	Expansion of Dighi Port (Non Major Port) to 30 MT in 1st Phase *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand, to be expanded to 90 MT by the third phase. The other phases cost to be worked out.*	Priority Project	MMB,GoM and Balaji Group	around INR 1200 crores
	7	Expansion of Dabhol Port (Non Major Port) to 10 MT *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand*	Priority Project	MMB,GoM and RGPPL	Cost to be confirmed with port management

	8	Expansion of Jaigad Port (Dhamankhol Bay Non Major Port) to 50 MT *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand*	Priority Project	MMB,GoM and Jindal Group (JSW)	Cost to be confirmed with port management
	9	Development of Jaigad Port (Lavgan Non Major Port) (5MT) *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand*	Priority Project	MMB,GoM and Chowgule Group	around INR 1000 crores
	10	Expansion of Redi Port to 33 MT (Non Major Port) *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand*	Priority Project	MMB,GoM Earnest John Group of Companies	Cost to be confirmed with port management
TRANSPORT- AIRPORTS	11	Greenfield Airport for Solapur at Boramani village *AAI is already in the process of developing the Greenfield Airport for Solapur in JV with MADC, GoM,*	**Early Bird Project**	Airports Authority of India (AAI), GoI & Maharashtra Airport development Company (MADC), GoM	around INR 250 crores (cost to confirmed by MADC)
	12	Upgradation of Karad Airport *Already proposed by MADC and the same was idnetified as part of BMEC to facilitate Sangli & Satara Nodes and logistic hub at Karad*	Priority Project	Maharashtra Airport development Company (MADC)	cost to confirmed by MADC
	13	Upgradation of Phaltan Airport *Already proposed by MADC and the same was idnetified as part of BMEC to facilitate Sangli & Satara Nodes and logistic hub at Karad*	Priority Project	Maharashtra Airport development Company (MADC)	cost to confirmed by MADC

15.7 Sangli Node: Atpadi

The proposed Node cum Mega City is located at the border of Sangli and Satara district in Atpadi taluk. The following table gives a snap shot of the proposed node at Sangli.

15.7.1 Snap Shot of Sangli Node Perspective

Estimated total land demand for Node development by 2041	16,766 acres (67 sqkm) Out of which industrial area is about 41 sqkm
Node size finalized for development:	**7,791acres (32 sqkm) Out of which industrial area is about 19 sqkm** with a ratio of 60% processing and 40% non-processing area, which will fulfill industrial land demand of the node up to2041.

15.7.2 Priority project of Sangli Node cum Megacity

As per the perspective plan projections, the Sangli Node is expected **to attract an investment of around 2115(4544) million USD and create an export value of around 1637 (3530) million USD by 2037 (2041).** In order to facilitate the same, the following are the priority projects to be taken up for the node.

Table: Node Level and Regional Level Priority Projects, Sangli Node

Sector	Sl. No.	Project Name	Project Category	Implementing Agency	Estimated Preliminary Project Cost (in crores)& No. of Phasing
Node Level Priority Projects					
Industrial Infrastructure	1	Land Mobilisation: Notification & acquisition/ mobilisation of 67 sq km of land within the earmarked for Node Development.	**Early Bird Project**	MIDC, GoM	Around INR 1006 crores (in 2 phases)
	2	Preparation of Detailed Master Plan for Sangli Industrial Node cum Mega city at Atpadi	**Early Bird Project**	SPV OF BMEC/ DMICDC,DIPP & GoM	
Water	3	Water Supply Infrastructure from Thakari LIS to the proposed Industrial Node at Sangli (Atpadi) *(Establishment of 10km long water supply infrastructure to the node)*	**Early Bird Project**		Around INR 474 crores (in 3 phases)
Roads	4	Upgradation of SH 76 from Sangli Node (Atpadi) to proposed expressway , 4 km (Upgradation to 4L) in 2 phases *(Primary approach road to the node site)*	**Early Bird Project**	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	Around INR 36 crores
Rail	8	Rail connectivity between Sangli Node (Atpadi) to Kolhapur-Kurduvadi Rail line from Sangole station,30 km *(last mile rail connectivity to the Node site)*	Priority Project	Central Railways, MoR,GoI	Around INR 300 crores
Energy	9	Extension of spur line (from Dhabol- Bengaluru gas trunk line) to the proposed Sangli Node from Sangli , 102 km	Priority Project	GAIL, GoI	Around INR 408 crores
Housing	10	Housing Development projects for Housing Demand of 71,598 in 2041 *(EWS: 8363, LIG: 63235)*	Priority Project		Around INR 4993 crores
Regional Level Priority Projects					
TRANSPORT- RAIL	1	Kolhapur-Miraj-Sangole-Pandharpur-Kurduvadi, 235 km, Upgradation to electrified double line *Proposed as part of BMEC. Improves connectivity of Sangli and Solapur Nodes with Bengaluru-Pune DFC*	Priority Project	Central Railways, MoR,GoI	around INR 2468
	2	Daund (Kurukumbh) - Solapur-Kalaburagi, 300 km, Upgradation to electrified double line *Proposed as part of BMEC to improve connectivity to Pune, Mumbai, Posrt of Mumbai & also to proposed Kalaburgi NIMZ*	Priority Project	South Western Railways, CR Railways, MoR, GoI	around INR 1395
TRANSPORT-ROADS	3	Proposed Greenfield Expressway : Sira (Tumkur/ Bengaluru)- Bigwan (Pune) (169 km, Phase 1 – 4Lane with 6L ROW. Starts by 2017 & opens by 2022 (Phase II-6 Lane) *Proposed as part of BMEC to enhance and establish high speed road transport connectivity between Bengaluru to Mumbai via Pune and other proposed Nodes of the region and to ease the forecasted traffic pressure on NH4 by 2020-25. Proposed with a design speed of 120 kms/ hr with access controls. The proposed alignment is expected to be in close proxnity to the proposed Sangli Node location and would facilitate development of the same.*	Priority Project	NHAI, MoRTH, GoI & Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 3120 crores
	4	NH 204/ SH 3: Kolhapur-Sangli-Kamalapur (130 km, Upgradation from 2L to 4L)	Priority Project	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 1170
		Kamalapur-Sangola (8 km, existing 4L)			
		Sangola - Ghatne (NH-9) (70 km, Upgradation from 2L to 4L)			around INR 630
	5	NH 9: Solapur- Kurkumbh- Pune, 260 km (Upgradation from 4L to 6L) *Proposed as part of BMEC for Pune Node. Improves connectivity between Bidar NIMZ and NH 4 through Solapur and Pune Node, Mumbai and ports of western coast of Maharashtra . It would also facilitate proposed Bidar NIMZ*	Priority Project	National Highway Authority of India (NHAI), GoI	around INR 2730 crores
TRANSPORT- PORTS (nearest to node)	6	Expansion of Dighi Port (Non Major Port) to 30 MT in 1st Phase *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand, to be expanded to 90 MT by the third phase. The other phases cost to be worked out.*	Priority Project	MMB,GoM and Balaji Group	around INR 1200 crores

	7	Expansion of Dabhol Port (Non Major Port) to 10 MT *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand*	Priority Project	MMB,GoM and RGPPL	Cost to be confirmed with port management
	8	Expansion of Jaigad Port (Dhamankhol Bay Non Major Port) to 50 MT *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand*	Priority Project	MMB,GoM and Jindal Group (JSW)	Cost to be confirmed with port management
	9	Development of Jaigad Port (Lavgan Non Major Port) (5MT) *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand*	Priority Project	MMB,GoM and Chowgule Group	around INR 1000 crores
	10	Expansion of Redi Port to 33 MT (Non Major Port) *Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand*	Priority Project	MMB,GoM Earnest John Group of Companies	Cost to be confirmed with port management
TRANSPORT- AIRPORTS	11	Greenfield Airport for Solapur at Boramani village *AAI is already in the process of developing the Greenfield Airport for Solapur in JV with MADC, GoM,*	Priority Project	Airports Authority of India (AAI), GoI & Maharashtra Airport development Company (MADC), GoM	around INR 250 crores (cost to confirmed by MADC)
	12	Upgradation of Karad Airport *Already proposed by MADC and the same was idnetified as part of BMEC to facilitate Sangli & Satara Nodes and logistic hub at Karad*	Priority Project	Maharashtra Airport development Company (MADC)	cost to confirmed by MADC
	13	Upgradation of Phaltan Airport *Already proposed by MADC and the same was idnetified as part of BMEC to facilitate Sangli & Satara Nodes and logistic hub at Karad*	Priority Project	Maharashtra Airport development Company (MADC)	cost to confirmed by MADC

16. Node Development Phasing and Costing

BMEC Perspective Plan proposes development of 10 Industrial Node cum megacity which is expected to attract an investment of around 73832 million USD and create 1.4 million direct employments in the corridor region by 2041. Out of these 10 nodes, the State Government of Karnataka and Maharashtra have identified three and two nodes respectively as priority nodes, which will be developed on priority basis. Further within these five priority nodes, Government of Karnataka has priortised Dharwad Node to be taken up for development immediately. Although it would be ideal to initiate development of all the nodes simultaneously, due to constrain in mobilizing the resources in terms of funds, land etc. it is best to strategically phase the development of these nodes based on their priority and market demand. Phasing strategies and preliminary costing were worked out considering five phases till completion of Plan horizon period, with 5 year time period under each phase. For the purpose of phasing the node development is categorized into, three broad components,

1. Land Acquisition/ Mobilisation
2. Node Development of Prioritized Nodes as per the minimum node size approved for immediate development by respective State Governments and
3. Development of other BMEC nodes and remaining area of Priority Nodes

The following are some of the phasing strategy adopted to structure the development of the nodes

16.1 Phasing of Development of BMEC Nodes

The following are some of the phasing strategy adopted to structure the development of the nodes:

1. Land being the prime resource for Node development, mobilizing land/ acquiring land, is the prioritized component of node development. Considering the fact that land prices escalates very steep within short span, to avoid huge investments & non availability of land at preferred node locations, its strategized to Phase land mobilization process for all the nodes (except Haveri, Sangli & Solapur nodes) within initial 10 years.
2. In fact Land mobilization process for the approved minimum node size of the priority nodes is phased to be completed within initial 2 to 5 years and land required for rest of the area of these priority nodes are phased to be mobilized within initial 5 to 10 years. In case of Dharwad Node , it is expected that land mobilization process is expected to be completed within initial 1 to 2 years (as some part of the land is already being acquired)
3. In case of Haveri, Sangli and Solapur, for which the development is deferred due to various reasons including infrastructure required for provision of water and also due to the fact the land prices of these locations are relatively lesser due to its locations far away from NH4, the land mobilization is phased within 2022 - 2032.
4. Based on market demand, ease of land availability and respective State Government's decision to prioritize development, the Node development of Dharwad & Satara nodes, is phased to have 60% of the development to be completed within initial 5 years and 90% to be completed within initial 10 years i.e. 30% in second 5 years. Only 10% of the development component is phased out in the third 5 year.

5. Priority Nodes like Belagavi, is phased to have only 20% of development within first 5 years, however due estimated market demand & its vocational advantages, it's proposed to have complete 70% within 10 years and 100% within 3rd 5 year. However, Chitradurga-Davanagere node, due to its location away from NH4 & need to have fresh land acquisition process is phased to only 35% of node development within first 10 years.
6. Although Ballari is not included in priority Nodes, based on suitability and demand assessment, land mobilization process is recommended to be initiated in the initial 5 years and the node development is proposed to start from second 5 year itself.
7. Sangli & Solapur Districts in Maharashtra and Hassan &Haveri districts in Karnataka are phased to be developed in Phase II, starting 2022.
8. The rest of node area of the five priority nodes i.e. Other than the recommended minimum node size is phased to be developed from 2032 onwards, except in case of Chitradurga-Davanagere node.

The following table illustrates the proposed development phasing of the nodes. Ideal node size proposed and phasing of node development activities are elaborated in below.

Table: Phasing of Node Development

Node	Size (sq km)	2017-22	2022-27	2027-32	2032-37	2037-41
Belagavi	44.7 + 87.2	2017-32 S1 (20%)	2032-41 S1 (50%)	S1 (30%)	S2 (50%)	S2 (50%)
Ballari	93.6	2017-37	2037-41 20%	25%	40%	15%
Chitradurga-Davanagere	39.8 + 23	2017-37 S1 (10%)	2037-41 S1 (25%)	S1 (30%)	S1 (35%)	S2 (100%)
Dharwad	37.3 + 21.8	2017-37 S1 (60%)	2037-41 S1 (30%)	S1 (10%)	S2 (50%)	S2 (50%)
Hassan	50.5	2017-32	2032-41 20%	30%	30%	20%
Haveri	20.7		2017-32 10%	2032-41 20%	30%	40%
Pune	72 + 162.7	2017-32 S1 (10%)	2032-41 S1 (40%)	S1 (50%)	S2 (50%)	S2 (50%)
Sangli	67.9		2017-32 10%	2032-41 20%	30%	40%
Satara	43.8	2017-41 S1 (60%)	S1 (30%)	S1 (10%)		
Solapur	99		2017-32 20%	2032-41 30%	30%	20%

Land acquisition process
Node Development – Priority Nodes
Node development – Rest of the Nodes
Year range

16.2 Preliminary costing for Node Development

Node development cost is one of the major investment components of BMEC's overall implimentaion cost. It would be appropriate to arrive at node development cost based on the broad concept plan for one node, however, at this stage, inorder to arrive at the overall investments required for development of BMEC's infrastructure components, a preliminary node development costing is estimated based on certain ball park figures and benchmarks.

Cost of node development is broadly categorised into three major cost components, **Land mobilisation Cost/ Land acquisition cost, Cost of External Infrastructure components of the Node and Cost of Internal Infrastructure of the node.**

16.2.1 Land mobilization / acquisition cost

Prevailing market rates based on information gathered from site visits, information on guidance value of land from respective State Government's revenue department websites, secondary data per unit area were used to assess to arrive at the cost of land at the identified node locations. These cost ranges were finalized based on inputs provided by KIADB & MIDC on industrial land acquisition rates of land parcels in the surroundings of these identified locations in reference with guidance value rates.

16.2.2 External Infrastructure

Last mile road and rail connectivity to the node site location from nearest main approach road and rail link, enhancement of existing approach road to the site, provision for water from nearest water source to the node, cost of providing power grid to the site, Gas pipeline connectivity to the site from the main trunk line or city level spur line, etc. were considered under external infrastructure projects for each node. Majority of these projects were already identified & discussed under sector wise infrastructure perspective plans and as part of the Node wise priority projects and cost estimates of the same are considered.

16.2.3 Internal Infrastructure

Internal infrastructure cost comprises cost estimations for **land development, physical infrastructure components within the site, including water infrastructure, waste water treatment, firefighting, power supply, internal transport infrastructure cost, etc.** Unit area cost was arrived at based on benchmarking similar Greenfield development projects in the country.

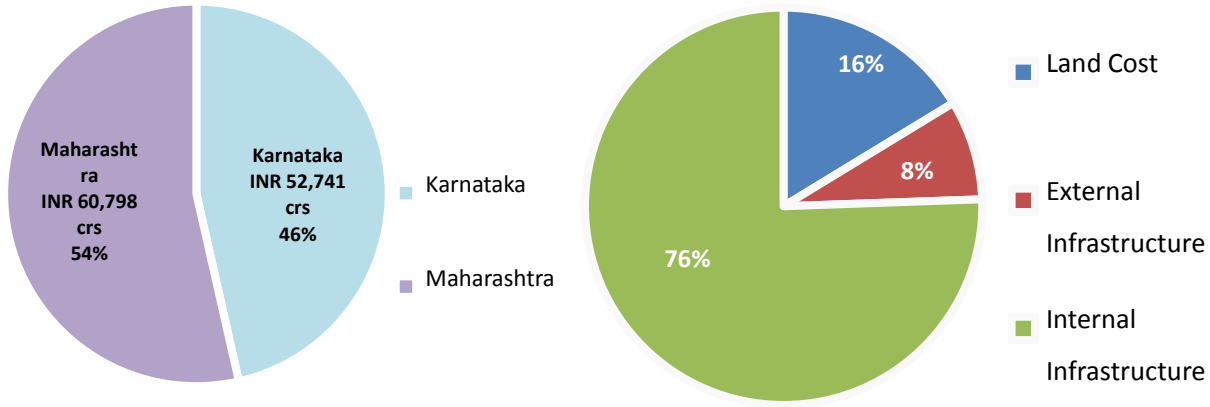
Land development cost includes earth works, soil stabilization, water retaining structures, etc. Water infrastructure includes raw water conveyance & treatment plant, distribution system with water mains and storage systems up to subsector level. Waste water treatment includes, Sewage network, Drainage network, Sewage Treatment plants, Effluent treatment plan, solid waste collection and management system, etc. Six Gas based power plants proposed as part of Power Infrastructure Perspective were to cater to Priority nodes as Captive Power Plant fulfilling 20-30% power demand of the nodes. Development phasing of these Power Plants were worked out as part of Internal Infrastructure cost of Node Development. Figure below shows node development in terms of land area and phasing.

16.3 Node Development cost

As per preliminary estimates, total cost of **Node development is about INR. 113,539 crores of which proposed 4 nodes in Maharashtra accounts for INR 60,798 crores and 6 nodes in Karnataka accounts for INR 52,741crores.**

Internal Infrastructure is the major component and estimated to be about INR 85,788 crores, 76% of the estimated total development cost

Figure: Total Node Development Cost



Source: Egis

Land acquisition and external infrastructure components of Node development cost is about INR 18,498 crores and INR 9,253 crores respectively. Six Captive power plants were accounted in internal infrastructure cost which is estimated to be INR 14,700 Crores

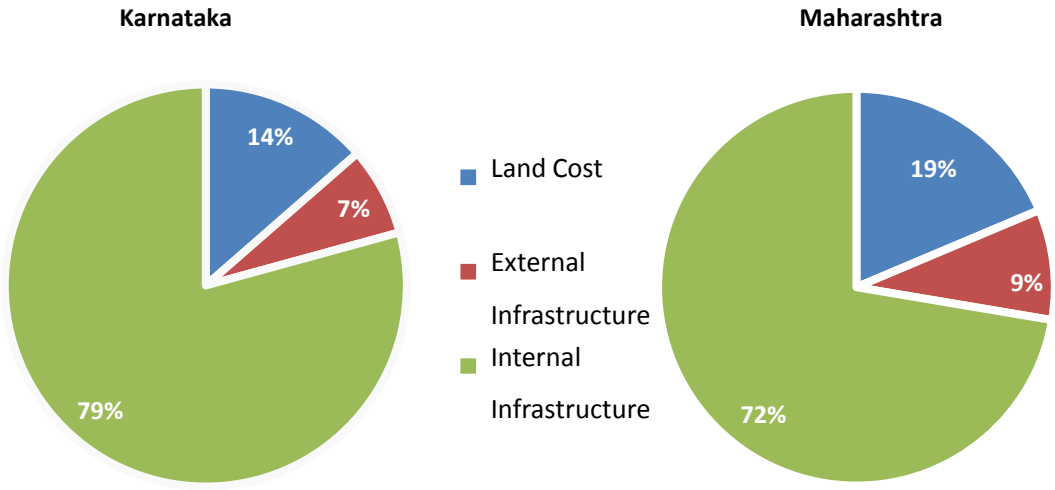
Major cost in node development is attributed to Pune Node in Maharashtra and Belagavi Node in Karnataka which accounts for 27% and 15% of the total cost respectively. **Dharwad, Belgavi & Chitradurga** in Karnataka and **Satara** in Maharashtra proposed as **priority nodes**, accounts for about **INR 43,638 crores, 38% of the total cost.**

Table: Phase wise Node development cost for ideal node size

Node	2017-22 (INR Crores)	2022-27 (INR Crores)	2027-32 (INR Crores)	2032-37 (INR Crores)	2037-41 (INR Crores)	Total (INR Crores)
Belagavi	2,331	5,630	2,152	3,590	3,590	17,293
Ballari	852	3,124	2,974	3,079	1,155	11,184
Chitradurga-Davanagere	1,178	1,590	1,167	1,145	1,895	6,975
Dharwad	3,613	2,755	797	1,946	896	10,007
Hassan	257	1,571	1,246	1,246	830	5,150
Haveri	-	208	732	511	681	2,132
Karnataka	**8,230**	**14,879**	**9,069**	**11,516**	**9,047**	**52,741**
Pune	3,083	9,463	4,372	7,041	6,691	30,649
Sangli	-	883	2,670	2,020	2,233	7,805
Satara	5,410	2,622	1,332	-	-	9,363
Solapur	-	3,078	5,126	2,794	1,982	12,980
Maharashtra	**8,493**	**16,045**	**13,500**	**11,855**	**10,906**	**60,798**
BMEC Core	**16,723**	**30,924**	**22,568**	**23,371**	**19,953**	**113,539**

Source: Egis

Figure: Total Node Development Cost



Source: Egis

16.3.1 Industrial Nodes in Karnataka

The three priority nodes in Karnataka require a total investment of around **INR 34090 crores** to develop them to their ideal size as per market demand. However, the initial development of three nodes are planned to be developed only to its minimum recommended nodes sizes and the cost of development for the same is estimated to be around **INR 19560 Crores.** Out of which, the **estimated investment requirements for the initial five years period for these three nodes are estimated to be around INR 7,122 crores, 36% of the total cost.** The cost of development of minimum recommended size of **37.36 km^2** for Dharwad node, which is approved to be developed as the first BMEC node in Karnataka is around **INR 6,628 Crores**. This indicates around **INR 2,690 Crores** of investment requirement in the initial phase towards **external & internal infrastructure** and around **INR 923 Crores** towards **land acquisition**, which is expected to be completed within 2 years of project commencement.

The following tables provides phase wise break of cost of land, External Infrastructure & Internal infrastructure, for the priority nodes in Karnataka for its recommended minimum node size:

Table: Development cost of Priority Nodes for recommended node size in Karnataka

Node	Type	Cost (in INR crores)				
		2017-22	2022-27	2027-32	2032-37	Total
Dharwad **(Minimum Recommended Node size – 37.36 km^2)**	Land Acquisition	923	-	-		923
	External Infrastructure	838	241	139		1,218
	Internal Infrastructure	1,852	1,976	658		4,487
	Total	***3,613***	***2,217***	***797***		***6,628***
Belagavi **(Minimum Recommended Node size – 44.67 km^2)**	Land Acquisition	1,104	-	-		1,104
	External Infrastructure	142	586	-		728
	Internal Infrastructure	1,085	2,887	2,152		6,124
	Total	***2,331***	***3,473***	***2,152***		***7,956***
Chitradurga-Davanagere	Land Acquisition	179	-	-		179
	External Infrastructure	671	668	185		1,524

(Minimum Recommended Node size – 39.78 km^2)	Internal Infrastructure	327	818	982	1,145	3,272
	Total	***1,178***	***1,486***	***1,167***	***1,145***	***4,976***

Source: Egis

16.3.2 Priority Industrial Nodes in Maharashtra

In Maharashtra, Satara shall be developed as the priority node with 60% of the development to be carried out in the first five years. Development of Pune node shall be initiated in the first five years, though only 10% of the node development is planned. Satara shall be considred as the Phase I Priority Node and Pune as Phase II Priority Node in Maharashtra. Minimum recommended node size for **Satara** is about **44 km^2**, which is expected to cater to the demand projected **till 2032**, requires a total investment of **INR 9,363 crores**

The following table provides the details of node development cost of these two priority nodes with break of Land Cost, External & Internal Infrastructure cost for development of its recommended node size:

Table: Development cost of Priority Nodes for recommended node size in Maharashtra

Node	Type	Cost (in INR crores)			
		2017-22	**2022-27**	**2027-32**	**Total Cost**
Phasel Priority Node					
Satara **(Minimum Recommended Node size – 43.83 km^2)**	Land Acquisition	866	-	-	866
	External Infrastructure	1,330	490	621	2,441
	Internal Infrastructure	3,213	2,132	711	6,056
	Total	***5,410***	***2,622***	***1,332***	***9,363***
Phase II Priority Node					
Pune **(Minimum Recommended Node size – 71.99 km^2)**	Land Acquisition	2,491	-	-	2,491
	External Infrastructure	-	416	361	777
	Internal Infrastructure	592	3,419	4,011	8,022
	Total	***3,083***	***3,835***	***4,372***	***11,290***

Source: Egis

Although, based on the inputs from MIDC, GoM & based on market demand it was decided to consider Satara as Phase I priority node and Pune as Phase II priority node of Maharashtra. Only 10% of development and 31% land aqusition has been proposed in Pune during the initial five years in order to facilitate development of Satara Node.

As discussed in the previous section, due to issues related to provision of water and mobilisation of land, the nodes of Solapur & Sangli will be considered as Phase II nodes and the following table provides the details of node development cost of these two nodes with break of Land Cost, External & Internal Infrastructure cost for development of its recommended node size:

Table: Development cost of Phase II priority Nodes for recommended node size in Maharashtra

Node	Type	Cost (in INR crores)			
		2022-27	**2027-32**	**2032-37**	**Total**
Sangli (Minimum Recommended Node size – 32 km^2)	Land Acquisition	229	229	-	459
	External Infrastructure	95	777	346	1,218
	Internal Infrastructure	558	1,116	1,674	3,349

Solapur (Minimum Recommended Node size – 46 km^2)	***Total***	***883***	***2,123***	***2,020***	***5,026***
	Land Acquisition	307	307	-	614
	External Infrastructure	92	594	-	686
	Internal Infrastructure	2,679	3,494	-	6,173
	Total	***3,078***	***4,395***	***-***	***7,473***

Source: Egis

However, as mentioned earlier these are preliminary cost estimates based on benchmarking and certain ballpark assumption. There will be further refinement to the cost assumption based on node wise site conditions and in context of master plan based components, which will be broadly discussed in the Broad Concept Plan stage.

17. Implementation and Investment Phasing

Overall strategic investment required to achieve the development scenario outlined in the **BMEC perspective Plan is about INR 325,172 crores for a period of next 25 years,** in which the **share of Karnataka and Maharashtra are INR 204,824 crores and INR 120,348 crores respectively**. **Node development accounts for highest share in overall investment of about INR 113,539 Crores**, followed by Port connectivity& Ports and Rail. Short, Medium and Long term investment required are 34%, 48% and 18% of the total investment estimated for Development of BMEC region.

Energy and Housing are two other major sectors which are addressed as part of infrastructure development. Energy sector requires overall investment of about INR 223,009 crores in which 71% goes into thermal based power plants. Housing sector requires overall investment of about INR 202,398 crores in which the share in EWS and LIG categories is around INR 10,169 crores and INR 192,229 crores respectively.

17.1 State Wise Projects and Costing

BMEC Perspective Plan has identified list of projects under each of the infrastructure sectoral heads. This includes, Ports, Port connectivity, Rail, Roads, Ports, Airports, Urban Transportation, Node and Development. Based on these sector wise lists, a comprehensive list of all infrastructure projects were prepared under each States and the same was categorised under three major development terms, to identify the term wise investment requirements under each of States, under each of these sectors. Energy and Housing sectors were also listed and discussed as separate components.

17.1.1 Development Phasing and Terms

All infrastructure perspective of BMEC have categorised their respective projects under five phases spanning the entire project period of 25 years, with each phase covering a span of 5 years. These projects listed under each infrastructure heads were reviewed & prioritised based on phased development of Industrial Nodes. The cost estimates of these projects were also phased according to these phased development and priority. For the purpose of identifying the priority projects and need for planning the investment required across various sectors for next 25 years, the phasing are further grouped under following three development terms:

1. **Short Term (2017-2022):** All infrastructure projects and node development components which are crucial to induce development in BMEC region and which needs to be initiated in the immediate future (i.e. within immediate 5 years) are identified & listed under Short Term development phasing and the cost towards developing the same, would form the Short Term Investment Plan of BMEC. Majority of the Early Bird projects and Priority infrastructure projects identified under the shortlisted five priority nodes and node development of these five priority nodes forms the major component of Short Term Development components of BMEC.

2. **Medium Term (2022- 2032):** Infrastructure project and node development projects which are scheduled to be initiated in the second phase (i.e. second five year term onwards) and projects which are second in the priority list, which needs to be initiated, however can be

completed over a span of 10 to 15 years from the initial year are categorised under Medium Term, which are spread across 10 years Starting from 2022.

3. **Long Term (2032-2041):** Large projects, which are to be developed over a period of more than three phases (i.e. more than three 5 years terms), project which needs long term investments or requires investments in all phases and projects which are essential for overall development of BMEC region, however the development is deferred towards last phases of the project horizon period, due to project viability issues are listed under Long Term development.

All the projects identified under BMEC perspective plan are categorised under these three broad development terms and are listed sector wise under each of the BMEC States. This list also provides the investment requirement under Short, Medium and Long term development stages are estimated under each state and under each sector, which would facilitate investment planning and development of the BMEC region. The following table and the subsequent report sections elaborate the same.

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
TRANSPORT- PORTS	**SHORT TERM (2017-22)**				
	1	NMPT:Expansion from 77 to 100 MTPA	Ministry of Shipping, GoI		**Expansion already planned by NMPT.Indetified as Early Bird project** for Chitradurga- Davangere Node
	2	Tadadi Port: Development of Greenfield Mega Port at Tadri *(49 MTPA capacity in 1st Phase)*	KSIIDC & IDD, Ports and Inland Water Transport Department, GoK and MoS,GoI or can be taken up by BMEC SPV	around INR 4410 crores	Greenfield port proposal by GoK (with a Phase I capacity of 34 MTPA), DPR is also prepared . Identified as an **Early Bird Project** for Dharwad Node as part of perspective plan. Would also facilitate Belagavi Node and Bellari region. MoS,GoI is planning to develop a Greenfield Satellite Port for NMPT & Murmugoa, Tadadi can be considered for the same. GoK has already requested MoS to develop Tadadi Port as Major Port by MoS.
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**4410**	
	MEDIUM TERM (2022-32)				
	1	Tadri Port: Development of Greenfield Mega Port at Tadri *(51 MTP capacity in 2nd Phase)*	KSIIDC & IDD, Ports and Inland Water Transport Department, GoK and MoS,GoI or can be taken up by BMEC SPV	around INR 4590 crores	Greenfield port proposal by GoK. Proposed as as part of BMEC. **1st Phase** proposed as Early Bird Project as part of BMEC. Development of Tadri port would not only facilitate the Nodes of Dharwad, Belagavi & Ballari region, but it would also facilitatethe Chitradurga-Davangere node. With the proposed connectivity enhancement through Talaguppa- Honnavar Rail link and NH206 upgradtion, Tadri port will be nearest port to Chitradurga node. Hence development of this port is one of the priority projects. Its already being proposed as a Greenfield port proposal by GoK (approx cost of 3000 crores)..Would also facilitate Belagavi Node and Bellari region. Mos is planning to develop a Greenfield Satellite Port for NMPT & Murmugoa, Tadri can be considered for the same.
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**4590**	
	LONG TERM (2032-41)				
	1	Haldipur Port : Development of Greenfield Mega Port at Haldipur *(50 MTP capacity in 1st Phase)*	KSIIDC & IDD, Ports and Inland Water Transport Department, GoK and MoS,GoI or can be taken up by BMEC SPV	around INR 4500 crores	Greenfield port proposal by GoK. Proposed as as part of BMEC.Mos is planning to develop a Greenfield Satellite Port for NMPT & Murmugoa, Haldipurcan be considered for the same.
	2	Expansion of Karwar port to 30 MTP	KSIIDC, IDD, Ports and Inland Water Transport Department, GoK and MoS,GoI	around INR 2097 crores	Proposed as part of BMEC. To facilitate Dharwad, Belagavi & Bellari nodes
	3	Haldipur Port : Development of Greenfield Mega Port at Haldipur *(50 MTP capacity in 2nd Phase)*	KSIIDC & IDD, Ports and Inland Water Transport Department, GoK and MoS,GoI or can be taken up by BMEC SPV	around INR 4500 crores	Greenfield port proposal by GoK. Proposed as as part of BMEC.
	4	NMPT: Additional capacity of 50 MTP	Ministry of Shipping, GoI	around INR 4500 crores	Proposed as part of BMEC.
	TOTAL COST FOR LONG TERM PROJETCS (INR Crs)			**15597**	
PORT CONECTIVITY - RAIL	**SHORT TERM (2017-22)**				
	1	Bengaluru-Hassan- Sakleshpur-NMPT **(DFC Spur Line)** *(360 km, Double Lining and Electrification)*	South Western Railways, Dedicated Freight Corridor Corporation of India (DFCCIL) , MoR,GoI	INR 7543 (including INR 2683 Crs for 18.5 km long Shiradi Ghat Tunnel)	Cost excluding Bengaluru- Hassan single line proposed by SWR (which is already under progress) andincluding cost of double line tunnel at Shiradi western ghat. Would facilitate, Tumkur NIMZ, Chitradurga- Davangere Node , Hassa Node and also all Industrial development around Bangalore region.

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
PORT CONECTIVITY - RAIL	2	Hubballi- Ankola **(DFC Spur Line)** *(167 km), New Line Double Line electrified*	Dedicated Freight Corridor Corporation of India (DFCCIL) ,South Western Railways, MoR,GoI and GoK	around INR 3596 crores	This project would act as the main port connectivity link for Dharwrad & Belagavi region. DFCL has considered this project & is already in the process of carrying out a PETS for double line DFC. SWR has also proposed & budgeted Single line connectivity. Land to be provided free of cost by State Govt. Environmental Clearance of the project remains pending. Central Empowered Committee (CEC) have made site visit & studied the EMP submitted by GoK. The report recommending in-principle approval for DFC only, with only limited stops/ stations is expected to be submitted to MoEF, very soon. Based on which MoEF is expected to provide clearnce.Proposed as DFC spur lineproviding port coinnectivity to Murmugoa Port, Karwar & proposed Tadadi Port, Belekeri & Honnavar Ports
	3	Hospete- Hubballi-Londa-Tinaighat-Vasco da Gama **(Ballari - Vasco DFC)** *(345km, upgradtion to double line)*	Dedicated Freight Corridor Corporation of India (DFCCIL) ,South Western Railways,Konkan Railways, MoR,GoI and GoK	Tinaighat-Vasco da Gama (around INR 1458 Crores)	Hospete- Hubballi-Londa-Tinaighat which is funded by ADB in already under implementation. Tinaighat-Vasco da Gama is pending due to environmental clearances and would be implemented by SWR. Chennai- Goa DFC(double line) proposal by DFCL is also planning same alignment till Hubli and then to follow Hubli-Ankola line.Identified as **Early Bird Project for Dharwad Node.**The project is being explored by MoS as part of the Sagarmala Project.
	4	Tumakuru-Arsikere-Birur-Shivamogga-Thalaguppa, *294 km*	South Western Railways, MoR,GoI & GoK	around 1764 INR	Arsikere to Devanur is already double line. BMEC proposes the entire stretch to be double line and electrified. Will connect Tumkur NIMZ & Chitradurga- Davangere Node to Tadadi Port via Thalaguppa & Honnavar. The project is being explored by MoS as part of the Sagarmala Project.
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**14361**	
	MEDIUM TERM (2022-32)				
	1	Thalaguppa to Honnavar *(74km, new line)*	South Western Railways, MoR,GoI & GoK	INR 999	Thalaguppa- Honnavar section is a new line proposed by SWR. Doubling is proposed under BMEC.The project is being explored by MoS as part of the Sagarmala Project.
	2	Davanagere- Birur *(Up gradation)* - Kadur- Chikmagaluru- Sakaleshpur *(New Line , 250 km)* - *Double lining with electrification*	South Western Railways, MoR,GoI	INR 1377 (Kadur-Sakaleshpur) INR 1155 (Davangere - Kadur)	This line would establish direct rail connectivity to NMPT port from both Davangere & Chitradurga.Davangere to Chikjajjur is proposed to be made double line electrified.Chikjajjur to Birur, which is already under implementation by SWR is proposed to be electrified (110 km) , Chitradurga to Chikjajjur Doubl lining(28 km) & Kadur- Chikmagaluru - Sakaleshpur new double line (102 Km, out of which 46 km long Kadur-Chikmagaluru of single line already completed, Chikmagaluru - Sakaleshpur work is in progress) . Land Provided State Govt, Being developed on cost sharing basis. Proposed as an **Early Bird Project** under BMEC for Chitradurga- Davangere Node . The project is being explored by MoS as part of the Sagarmala Project.
	3	Belagavi - Sawantwadi-Redi Port *(122 km, New Line)*	South Western Railways, MoR,GoI	around INR 1647	Project under consideration by SWR.Double lining of the entire stretch proposed under BMEC as **Early Bird Project for Belgavi Node.** The project is being explored by MoS as part of the Sagarmala Project.
	TOTAL COST FOR MEDIUM TERM (INR Crs)			**5178**	
PORT CONNECTIVITY- ROADS (including TUNNELS AND BRIDGES)	**SHORT TERM (2017-22)**				
	1	NH 48 : Bengaluru- Mangalore *(353 km , Up gradation to 6L)*	National Highway Authority of India (NHAI), GoI & GoK	around INR 5860 Crores (including INR 2683 Crs for 18.5 km long Shiradi Ghat Road Tunnel)	Proposed to enhance connectivity between Bengaluru region and Mangaluru. 4 lane up gradation is already proposed by NHAI and is under implementation. It is proposed to upgrade the same to 6 lane.Would facilitate, Tumkur NIMZ, Chitradurga- Davangere Node , Hassa Node and also all Industrial development around Bangalore region.Shiradi Ghat would provide the shortest connectivity to NMPT across Western Ghats for Bengaluru, Tumkura NIMZ, Chitradurga-Davngere Node. GoK, has requested JICA and the same is being studied by JICA
	2	NH -63: Hubballi- Ankola Stretch *(Up gradation from 2L to 4L, 132 km)*	National Highway Authority of India (NHAI), GoI & GoK	around INR 1188 Crores	Proposed as **Early Bird Project** for Dharwad Node. Enhances connectivity to Murmugoa, Karwar & Tadri Ports (NHAI Proposal). GoK has requested to drop the project since it passes through Western Ghats. The project is being explored by MoS as part of the Sagarmala Project.
	3	NH -206: Tumkur- Honnavar Port *(373 km, Up gradation from 2L to 4L)*	National Highway Authority of India (NHAI), GoI & GoK	around INR 3357 crores	Proposed to enhance connectivity between Chitradurga- Davangere node & Tumkur NIMZ to proposed Tadadi Port, Belekeri, Honnavar Ports. The project is being explored by MoS as part of the Sagarmala Project.
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**10405**	

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
PORT CONNECTIVITY- ROADS (including TUNNELS AND BRIDGES)	**MEDIUM TERM (2022-32)**				
	1	Shiradi Ghat on NH 48 *(18.5 km, Up gradation of 2L to 4L)*	National Highway Authority of India (NHAI), GoI	around INR 2683	Proposed as part of BMEC. 2 lane tunnelling was proposed in Phase I and upgradtion to 4 lane in phase II
	2	SH -1 : Thirthahalli - Agumbe*(46 km, Up gradation of 1L to 2L)*	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around INR 253	Proposed as part of BMEC.
		SH 65 : Agumbe - Malpe Port *(43 km, Up gradation of 1L to 4L)*	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around INR 473	
	3	SH 2: Haveri - Yekkambi *(54 km, Up gradation to 2L)* **Phase 1**	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around INR 297 crores	Proposed as part of BMEC. The project is being explored by MoS as part of the Sagarmala Project.
		SH 69: Yekkambi to Kumta/ Belekeri *(73 km, Up gradation to 4L)*	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around INR 803 crores	
	4	NH 234: (Sira) - Banavara - Mangaluru Port *(288 km, Up gradation to 4L)*	National Highway Authority of India (NHAI), GoI & GoK	around INR 2592 crores	Proposed as part of BMEC.Enhances connectivity for to NMPT Port from Chitradurga- Davangere Node
	5	Belagavi-Panjim (NH4A) Up gradation to 4 lane*, 148 km*	National Highway Authority of India (NHAI), GoI & GoK	around INR 1332 Crores	Proposed as **Early Bird Project** under BMEC for Belagavi Node to Murmugoa Port. (Status: Project could not be commenced due to delay in handing over land by land owners, delay in clearance of forest diversion proposals and wildlife clearance). The project is being explored by MoS as part of the Sagarmala Project.
	6	4 lanning of NH 13 from Chitradurga to Mangaluru Port via Bhadravati *(313 km)*	National Highway Authority of India (NHAI), GoI & GoK	around INR 2817 Crores	Proposed as **Early Bird Project** under BMEC for Chitradurga Node to NMPT Port
	7	SH -1 : Thirthahalli - Agumbe*(46 km, Up gradation of 2L to 4L)*	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around INR 299	Proposed as part of BMEC.
	8	SH 2: Haveri - Yekkambi *(54 km, Up gradation to 4L)* **Phase 2**	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around INR 351 crores	Proposed as part of BMEC. The project is being explored by MoS as part of the Sagarmala Project.
	TOTAL COST FOR MEDIUM TERM PROJECTS (INR Crs)			**11900**	
TRANSPORT- RAIL	**SHORT TERM (2017-22)**				
	1	Davangere - Hubballi - *Up gradation of Existing line to Double line with electrification, 144 km*	South Western Railways, MoR, GoI	around INR 1512 crores	Proposed as part of Mumbai- Chennai, High Speed Rail Line by Indian Railways. Proposed as part of BMEC. As this will act as external trunk Infrastructure for Dharwad Node, GoK is requesting this project to be funded totally by GoI
	2	Davangere- Shivamoga- *Double lining with electrification (New Line, 90 km)*	South Western Railways, MoR, GoI	around INR 1215 crores	Proposed as single line by SWR. Doubling is proposed under BMEC.
	3	Belagavi- Miraj Up gradation *(138 km, Double lining with electrification)*	South Western Railways, MoR, GoI	around INR 1587 crores	Proposed as High Speed Rail Line by Indian Railways, proposed as part of BMEC as double line.As this will act as external trunk Infrastructure for Belagavi Node, GoK is requesting this project to be funded totally by GoI
	4	Belagavi-Kalaburgi via Shahabad, Vijayapura & Shedbal *(New Line, Double line electrified).Proposed as Connectivity to Kalaburgi NIMZ*	South Western Railways, MoR, GoI & GoK	Shahabad- Shedbal Stretch (around INR 350 crores)	Connects Kalaburagi (NMIZ) to Belagavi (DFC) and connects to other western ports through Belagavi.As this will act as external trunk Infrastructure for Kalaburagi (NMIZ), GoK is requesting this project to be funded totally by GoI
	5	Tumakuru-Chitradurga-Davanagere , *256 km long new line, proposed as Double lining with electrification*	South Western Railways, MoR, GoI & GoK	around INR 2688 crores	Single line is proposed under SWR. GoK to provide land. Double line with electrification is proposed as **Early Bird Project** for Chitradurga- Davangere Node. This will be the direct & shortest rail connectivity from Bengaluru to Chitradurga & Davangere via Tumakuru. Currently, the Bengaluru-Mumbai line is a longer route & does not connect Chitradurga., hence this proposalis very crucial for the node. As this will act as external trunk Infrastructure to Tumkur NIMZ & also for Chitradurga-Davangere Node, GoK is requesting this project to be funded totally by GoI

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
TRANSPORT- RAIL	6	Hubballi - Belagavi Direct line *Proposed New Double Line , 100 km*	South Western Railways, MoR, GoI	around INR 1050 crores	Proposed as double line as part of BMEC corridor. Identified as **Early Bird Project** under Belagavi Node project
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**8402**	
	MEDIUM TERM (2022-32)				
	1	Tumakuru-Chitradurga-Davanagere- **(DFC)** *256 km*	Dedicated Freight Corridor Corporation of India (DFCCIL) ,MoR, GoI	around INR 3596 crores	Proposed as part of Mumbai -Bengaluru- Chennai - Diamond Quadrilateral, Proposed as DFC as a part of BMEC
	2	Davangere - Hubballi - Belagavi - **(DFC)***(285 km)*	Dedicated Freight Corridor Corporation of India (DFCCIL) ,MoR, GoI	around INR 7268 crores	Proposed as part of Mumbai -Bengaluru- Chennai - Diamond Quadrilateral, Proposed as DFC as a part of BMEC
	3	Belagavi – Sangli/Miraj **(DFC)** *(145 km)*	Dedicated Freight Corridor Corporation of India (DFCCIL) ,MoR, GoI	aroundINR 3698 crores	Proposed as part of Mumbai -Bengaluru- Chennai - Diamond Quadrilateral, Proposed as DFC as a part of BMEC
	4	Chitradurga-Challakere-Molakalmuru-Rayadurga-Ballari.*152 km long up gradation of single line to double line.*	South Western Railways, MoR, GoI & GoK	around INR 1596 crores	Proposed as part of BMEC. Will enhance connectivity between Chitradurga & Bellari
	5	Gadag – Haveri, *New Line,54 km*	South Western Railways, MoR, GoI	around INR 729	Proposed as part of BMEC have shortest connectivity to Bengaluru & Mangaluru
	6	Bidar - Kalaburagi, *117 km, New Line(double line electrified)*	South Western Railways, MoR, GoI	around INR 2390	NIMZ Connectivity Line, New line proposed by Railways considered as part of BMEC rail perspective.
	7	Hosapetee- Davanagere, *130 km, Up gradation to double line electrified*	South Western Railways, MoR, GoI	around INR 1365	Proposed as part of BMEC to enhance connectivity between Bellary region to NMPT and also connects Chitradurga- Davanagere Node.
	8	Koppal - Kudalasangama Road(Almatti) *(121 km, New Line)*	South Western Railways, MoR, GoI	around INR 1647	Proposed as part of BMEC.
	9	Yadgir - Kudalasangama Road *(169 km, New Line)*	South Western Railways, MoR, GoI	around INR 2282	Proposed as part of BMEC.
	10	Gadag-Bagalkot-Vijayapura-Solapur(Hotgi Jn) *(295km, Up gradation)*	South Western Railways, MoR, GoI	around INR 3098	Proposed as part of BMEC.
	11	Ranajitpura - Bannihatti-Hosapete, *(23 km, Upgradation)*	South Western Railways, MoR, GoI	around INR 276 crores	Proposed as part of BMEC
	12	Raichur - Ginigera (near Koppal), 176 km	South Western Railways, MoR, GoI	around INR 2376	Proposed as part of BMEC
	13	Bagalkot - Belagavi, *145 kms long New Line & Double line electrified*	South Western Railways, MoR, GoI	around INR 1958 crores	Project Proposed by SWR, proposed as Double line with electrification as part of BMEC
	TOTAL COST FOR MEDIUM TERM PROJECTS (INR Crs)			**32279**	
TRANSPORT- ROADS (including TUNNELS/BRIDGES)	**SHORT TERM (2017-22)**				
	1	Proposed Greenfield Expressway : Sira (Tumkur/ Bengaluru)- Bigwan (Pune) *(416 km, Phase 1 – 4Lane with ROW of 100 meters. Starts by 2017 & opens by 2022 (Phase II-6 Lane)*	NHAI, MoRTH, GoI & Karnataka Road Development Corporation Ltd. (KRDCl), IDD, GoK	around INR 7696 crores	Proposed to enhance and establish high speed road transport connectivity between Bengaluru to Mumbai via Pune and other proposed Nodes of the region and to ease the forecasted traffic pressure on NH4 by 2020-25. Proposed with a design speed of 120 kms/ hr with access controls.

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
TRANSPORT- ROADS (including TUNNELS/BRIDGES)	2	6 lanning of NH4 Stretch between Chitradurga- Haveri-Hubballi *(215 km, Up gradation from 4L to 6L)*	National Highway Authority of India (NHAI)	around INR 2257 Crores	Proposed as **Early Bird Project.** NHAI is already preparing feasibility study.
	3	SH 19: Challakere - Ballari *(103 km, Up gradation to 4L)*	MoRTH, GoI	around INR 670 Crores	Project under MoRTH. Proposed as an **Early Bird Project** under BMEC
	4	6 Lanning of Belagavi-Sankeshwar-Kolhapur NH4 *(96 km, from existing 4 lane to enhance connectivity between Belagavi & Kolhapur)*	NHAI, GoI & GoK	around INR 1011 Crores	Proposed as **Early Bird Project** as part of BMEC for Belagavi Node
	5	SH 71 & SH 71E: Tiptur - Hassan *(53 km, Up gradation from 1L to 4L)*	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around INR 637	Proposed to enhance connectivity between Chitradurga- Davangere node & Tumkur NIMZ to NMPT
	6	6 Laning of Hubballi -Dharwad NH4 Bye-Pass (30 km stretch) , to provide direct connectivity to Belur Industrial Area	NHAI, GoI & GoK	around INR 390 Crores	Already proposed by GoK. Proposed as **Early Bird Project** for Dharwad Node.Currently this is an undivided two lane road and this is the major connectivity to the proposed node. Hence widening of this road should be taken up on priority.
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**12661**	
	MEDIUM TERM (2022-32)				
	1	SH 20: Belagavi - Salahalli *(80 km, Up gradation to 4L, Belagavi - BMEC Expressway)*	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around INR 520 Crores	Proposed as part of BMEC.
	2	SH 12: Vijaypura- Athani *(74 km, Up gradation to 4L)*	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around INR 481	Proposed as part of BMEC.
	3	Development of Outer Peripheral Ring Road at Belagavi City*(Kakti- Sulga-Udyambag-Majagaon-Old PB Road-Kalkamb-Mutennati-Kakati, total*	DULT,GoK	around INR 986 Crores	Proposed by DULT. Proposed as **Early Bird Project** under BMEC for Belagavi Node
	4	Up gradation (4 lanning) of SH 141 connecting the Belagavi node with Belagavi City *(around 24 kms)*	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around INR 360 Crores	Proposed as part of BMEC for Belagavi Node
	5	4 Lanning of Chitradurga (Donnehalli)-Hospete NH13, 90 km *(from existing 2 lane)*	NHAI, GoI & GoK	around INR. 776 crores	Proposed as **Early Bird Project** as part of BMEC for Chithradurga- Davangere Node. Already proposed & budgeted under NHAI.This primary connectivity to the node and connects to Chitradurga & NH4 and to Hospet and Solapur. This road needs to be upgraded(from existing 2 lane.) Already proposed & budgeted under NHAI.
	6	4 Lanning of 58 KM long Davangere-Donnehalli SH 65 connectivity to Chithradurga- Davangere Node .	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around INR 669 Crores	Proposed as **Early Bird Project** as part of BMEC for Chithradurga- Davangere Node.This road is another major connectivity to the node connecting it to Davangere city and NH4. This SH needs to be enhance to 4 lane connectivity.
	7	Up gradation of MDR connectivity from Chithradurga Node (Chikkagondanahalli-Sangenahalli-Donnehalli) to SH 19- 30 kms	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around 111 crores	Proposed as part of BMEC for Chitradurga Node
	8	Up gradation of SH 45 connectivity from Chithradurga Node (Chikkagondanahalli-Sangenahalli-Donnehalli) to SH 19- 30 kms (Connectivity to Ballari airport), 14 km to 4L	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around 153 crores	Proposed as part of BMEC for Chitradurga Node
	9	Up gradation of MDR connectivity from Chithradurga Node (Chikkagondanahalli-Sangenahalli-Donnehalli) to SH 19- 30 kms (Connectivity to Ballari airport), 14 km to 4L **(Phase 2)**	Karnataka Road Development Corporation Ltd. (KRDCl),GoK	around 86 crores	Proposed as part of BMEC for Chitradurga Node
	TOTAL COST FOR MEDIUM TERM PROJECTS (INR Crs)			**4142**	

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
TRANSPORT-AIRPORTS	**SHORT TERM (2017-22)**				
	1	Hubballi Airport *(Up gradation to International Airport)*	Airports Authority of India (AAI) & IDD, GoK	around INR 160 crores	The AAI will expand it into an all-weather airport. GoK has mobilised land for the same. Currently work is under progress. BMEC has proposed to develop it as an International Airport with Cargo Handling facility
	2	Belagavi Airport *(Up gradation)*	Airports Authority of India (AAI) & IDD, GoK	around INR 293.35	Expansion Underway
	3	Development of Greenfield Airport at Shivamogga.	Airports Authority of India (AAI) & IDD, GoK	around INR 194 crores	Project was already initiated through PPP mode by GoK, currently not under progress, AAI may conisder taking over for development, if PPP mode fails. BMEC has proposed the same to facilitate Chitradurga Node & Tumkur NIMZ.
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**648**	
ENERGY	***Note: By 2041 , the Karnataka Region of BMEC will have an additional power demand of 16,274 MW which is proposed to be met by 16 Wind Power Plants of 120 MW capacity, 7 SHP of 25 MW capacity, 3580 MW to be met by Solar power plants, 2.5 UMPPs of 4000 MW capacity, 3 STPS of 1000 MW capacity and 3 Gas based power plants of 700 MW capacity.***				
	SHORT TERM (2017-22)				
	By 2017, Karnataka would have an additional demand of 1010 MW which is proposed to be met by 1 wind power plant of 120 MW capacity (854 crores), 2 SHPs (245crores), 81 MW to be met by solar power plants (557crores) and 1 STPS (around INR 6500 crores)				
	The other power projects already proposed in the region are listed below				
	1	Development of gas based power plant of 700 MW in Belagavi district (to be expanded to 2100 MW in later phases)	Power Company of Karnataka Ltd. (KPCL),GoK	around INR 3500(as per govt. estimates)	Already proposed by GoK, Proposed as part of BMEC
	2	Ghataprabha Hydel project 2X 10 MW	Power Company of Karnataka Ltd. (KPCL),GoK	costing to be confirmed with KPCL	Project is approved. Proposed as **Early Bird Project** as part of BMEC
	3	Development of gas based power plant of 700 MW at Davangere district (to be expanded to 2100 MW in later phases)	Power Company of Karnataka Ltd. (KPCL),GoK	around INR 3500(as per govt. estimates)	Proposed by GoK, Proposed as part of BMEC
	4	Gulbarga Super Critical Thermal Power Station	Power Company of Karnataka Ltd. (KPCL),GoK	Costing to be confirmed by KPCL	Proposed by GoK, Proposed as part of BMEC
	5	2X 660 MW coal based thermal power plant in two phases in Hassan	Power Company of Karnataka Ltd. (KPCL),GoK	Costing to be confirmed by KPCL	Location: Hassan District of Karnataka, comprising of villages Busttenahalli, Doddahonnenahalli and Kasturavalli., 10 km from Hassan Water : Allocation of water from Hemavathi reservoir , 25 km from plant. Land: 605 acres allotted for the project by KIADB
	6	Gundia Hydel Project, 2X 200 MW	Power Company of Karnataka Ltd. (KPCL),GoK	Costing to be confirmed by KPCL	Proposed by GoK
	7	Tadadi Combined Gas Power Plant, 2100 MW (proposed)	Power Company of Karnataka Ltd. (KPCL),GoK	Costing to be confirmed by KPCL	Proposed by GoK
	8	Unit III of Ballari Thermal Power Station (700 MW)	Power Company of Karnataka Ltd. (KPCL),GoK	Costing to be confirmed by KPCL	Ongoing project
	9	YeramarusThermal Power Station (2X 800 MW)	Power Company of Karnataka Ltd. (KPCL),GoK	Costing to be confirmed by KPCL	Ongoing project
	10	Edlapur Thermal Power Station 800 MW	Power Company of Karnataka Ltd. (KPCL),GoK	Costing to be confirmed by KPCL	Proposed by GoK
	11	Development of Hydel Power Plant of 400 MW at Gundia *(already proposed by KPCl)*	Karnataka Power Corporation Ltd. (KPCL)	around INR 1126	Proposed as part of BMEC.Node based priority project for Hassan Node

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
URBAN TRANSPORTATION		**SHORT TERM (2017-22)**			
	1	Development of Logistic Hub in Hubballi- Dharwad	Infrastructure Development Department, GoK	around INR 350 crores	
	2	Completion of Hubli-Dharwad BRTS	DULT, GoK	around INR 450 Crore	Already under implementation by Hubli- Dharwad BRTS Company, DULT,GoK. Identified as part of BMEC for Dharwad Node
		TOTAL COST FOR SHORT TERM PROJETCS INR Crs)		**800**	
		MEDIUM TERM (2022-32)			
	1	Implementation of Intelligent Transportation System (ITS) for Public Transportation at Belagavi	DULT, GoK	around INR 110 crores	Proposed by DULT and project is in pre feasibility stage. Proposed as part of BMEC for Belagavi Node
	2	Development of Logistic Hub in Hassan	Karnataka Infrastructure Development Department, GoK	around INR 350 crores	Proposed as PPP project by KIDD. Project in Pre feasibility stage. Proposed as part of BMEC also.
	3	Durgadekeri-Belur-Dharwad- Hubli City- Hubli Airport connectivity (Metro Rail)	MoUD & DULT, GoK	around INR 350 Crore/ km (approx.)	Proposed as part of BMEC for Dharwad Node
	4	Vantamuri - Belagavi City- Belagavi Airport connectivity (Metro Rail) (around 9 Km)	MoUD & DULT,GoK	around INR 3150 crores	Proposed as part of BMEC for Belagavi Node
		TOTAL COST FOR MEDIUM TERM PROJETCS INR Crs)		**26710**	
NODE DEVELOPMENT		**DHARWAD NODE**			
		SHORT TERM (2017-22)			
	1	**LAND ACQUISITION (2017-22)**	KSIIDC, GoK	around INR 923 Crore	Land Acquisition for the node to be initiated on priority
	2	**EXTERNAL INFRASTRUCTURE**			
	2.1	**ROADS:** Upgradation of SH 140 **from SL to 2L+PS** connecting NH 4 and SH 34 passing through the node, 16km	PWD/KRDCL GoK	around INR 136 crores	This is a section of the alternate port connectivity from Dharwad node to Karwar and Belekeri ports
	2.2	**ROADS:** Upgradation of road connecting NH 4(via Kotur- Belur Land parcel) and Tegur- Mandihal MDR from from **SL to 4L, 8 km**	PWD/KRDCL GoK	around INR 120 crores	This will act as a connectivity bypassing NH 4 , between the Dharwad Node and Kotur Land Parcel
	2.3	**ROADS:** Road from NH 4 through Belur Industrial areas to road abuting Kotur land parcel (2km stretch new 4L to be developed, 3 km stretch within Belur IA to be upgraded from 2L to 4L), 5 km	PWD/KRDCL GoK	around INR 59 crores	This will act as a connectivity bypassing NH 4 , between the Dharwad Node and other industrial areas including Belur Industrial area, Mummigatti , upcoming TATA vendor park etc. This road will facilitate these industrial areas to utilize the Logistic hub facility located in Dharwad Node
	2.4	**ROADS:**Development of new 4L road from proposed logistic hub to SH 140,7 km	PWD/KRDCL GoK	around INR 112 crores	This road will act as a continuation of the connectivity between NH 4 and SH 140 which is the proposed altenate port connectivity.
	2.5	**WATER SUPPLY:** Water Supply Infrastructure from Malaprabha (Renukasagara reservoir) / Hidkal to the proposed Industrial Node at Dharwad **(Phase 1: 2017-22)**	KIADB,GoK	around INR 311 crs/ INR 489crs	Proposed as **Early Bird Project** for Dharwad Node
	2.6	**ENERGY:** Dhabol- Bengaluru gas pipeline's Spur line to the Belur Industrial Area , proposed Dharwad Node and Hubli-Dharwad City- 65 KMs long Manoli- Dharwad spur line & additional length of around 20 to 25 km to the Node	GAIL & KSIIDC, GoK	Around INR 100 Crs .(Costing to be confirmed with GAIL)	Proposed as part of Phase II development of Dhabol-Bengaluru gas pipeline and the same is proposed to be extended to the Dharwad Node

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
NODE DEVELOPMENT	3	**SITE DEVELOPMENT(2017-22)**	KSIIDC, GoK	around INR 1852 Crore	This includes internal infrastructure within the node like road networks, water supply line, solar panels etc.
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**3613**	
	MEDIUM TERM (2022-32)				
	1	**LAND ACQUISITION (2022-27)**	KSIIDC, GoK	around INR 538 Crore	Land Acquisition for the node to be continued in this phase.
	2	**SITE DEVELOPMENT (2022-27)**	KSIIDC, GoK	around INR 1976 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants, solar panels etc.
	3	**EXTERNAL INFRASTRUCTURE**			
	3.1	**ROADS:** Upgradation of SH 140 from 2L+PS to 4L connecting NH 4 and SH 34 passing through the node, 16km	PWD/KRDCL GoK	around INR 104 crores	This is a section of the alternate port connectivity from Dharwad node to Karwar and Belekeri ports
	3.2	**WATER SUPPLY:** Water Supply Infrastructure from Malaprabha (Renukasagara reservoir) / Hidkal to the proposed Industrial Node at Dharwad **(PHASE 2: 2022-27)**	KIADB,GoK	around INR 137 crs/ INR 152 crs	1st phase Proposed as Early Bird Project as part of BMEC for Dharwad Node
	4	**SITE DEVELOPMENT (2027-32)**	KSIIDC, GoK	around INR 658 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants, solar panels etc.
	5	**EXTERNAL INFRASTRUCTURE**			
	5.1	**WATER SUPPLY:** Water Supply Infrastructure from Malaprabha (Renukasagara reservoir) / Hidkal to the proposed Industrial Node at Dharwad **(PHASE 3: 2027-32)**	KIADB,GoK	around INR 139 crs/ INR 154crs	1st phase Proposed as Early Bird Project as part of BMEC for Dharwad Node
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**3552**	
	LONG TERM (2032-41)				
	1	**SITE DEVELOPMENT(2032-37)**	KSIIDC, GoK	around INR 1946 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	2	**SITE DEVELOPMENT(2037-41)**	KSIIDC, GoK	around INR 896 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR LONG TERM PROJETCS (INR Crs)			**2842**	
	TOTAL COST FOR NODE (INR Crs)			**10007**	
	CHITRADURGA- DAVANAGERE NODE				
	SHORT TERM (2017-22)				
	1	**LAND ACQUISITION (2017-22)**	KSIIDC, GoK	around INR 179 Crore	Land Acquisition for the node to be initiated in this phase.
	2	**SITE DEVELOPMENT(2017-22)**	KSIIDC, GoK	around INR 327 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	3	**EXTERNAL INFRASTRUCTURE**			

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
NODE DEVELOPMENT	**3.1**	**WATER SUPPLY**: Water Supply Infrastructure from Tungabhadra Reservoir / Bhadra/ Vanivila Sagar to proposed Industrial Node at Chitradurga (90 kms) **(Phase1 : 2017-22)**	KIADB,GoK	around INR 671/ INR 878/ INR 526	Proposed as **Early Bird Project** for Chithradurga Node
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**1178**	
	MEDIUM TERM (2022-32)				
	1	**LAND ACQUISITION (2022-27)**	KSIIDC, GoK	around INR 104 Crore	Land Acquisition for the node to be continued in this phase.
	2	**EXTERNAL INFRASTRUCTURE (2022-27)**			
	2.1	**RAIL**: Developing rail connectivity & siding for the Chithradurga Node connecting to Chithradurga- Ballari Rail link, 22 km	South Western Railways, MoR, GoI & GoK or BMEC SPV	around INR 220 Crore	Proposed as part of BMEC.Node based priority project for Chitradurga & Davangere.rail link, which connect the node directly to the main Chitradurga- Ballari existing rail link.
	2.2	**ROADS**: 4 Lanning of Chitradurga-Donnehalli stretch of NH13, 30 km *(from existing 2 lane)*	NHAI, GoI & GoK	around INR. 258 crores	Proposed as **Early Bird Project** as part of BMEC for Chithradurga- Davangere Node. Already proposed & budgeted under NHAI
	2.3	**WATER SUPPLY**: Water Supply Infrastructure from Tungabhadra Reservoir / Bhadra/ Vanivila Sagar to proposed Industrial Node at Chitradurga (90 kms) **(Phase 2 : 2022-27)**	KIADB,GoK	around INR 180/ INR 167/ INR 155	1st phase Proposed as Early Bird Project as part of BMEC for Chithradurga Node
	2.4	**ENERGY**: Dhabol- Bengaluru gas pipeline's Spur line from main trunk line (Chithradurga Node lies close to existing alignment, just around 5 to 6 kms away)	GAIL, GoK	Around INR 10 Crs .(Costing to be confirmed with GAIL)	Proposed as part of BMEC for Chitradurga Node. direct connectivity will attract Gas based industries and would facilitate establishment of gas based captive power plant within the node.
	3	**SITE DEVELOPMENT (2022-27)**	KSIIDC, GoK	around INR 818 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	4	**SITE DEVELOPMENT (2027-32)**	KSIIDC, GoK	around INR 1067 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	5	**EXTERNAL INFRASTRUCTURE (2027-32)**			
	5.1	**WATER SUPPLY**: Water Supply Infrastructure from Tungabhadra Reservoir / Bhadra/ Vanivila Sagar to proposed Industrial Node at Chitradurga (90 kms) **(Phase3: 2027-32)**	KIADB,GoK	around INR 185/ INR 172/ INR 160	1st phase Proposed as Early Bird Project as part of BMEC for Chithradurga Node
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**2757**	
	LONG TERM (2032-41)				
	1	**SITE DEVELOPMENT (2032-37)**	KSIIDC, GoK	around INR 1145 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	2	**SITE DEVELOPMENT (2037-41)**	KSIIDC, GoK	around INR 1895 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR LONG TERM PROJETCS (INR Crs)			**3041**	
	TOTAL COST FOR NODE (INR Crs)			**6790**	

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
NODE DEVELOPMENT	**BELAGAVI NODE**				
	SHORT TERM (2017-22)				
	1	**LAND ACQUISITION (2017-22)**	KSIIDC, GoK	around INR. 1104 crores	Land Acquisition for the node to be initiated in this phase.
	2	**SITE DEVELOPMENT (2017-22)**	KSIIDC, GoK	around INR 1085 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	3	**EXTERNAL INFRASTRUCTURE**			
	3.1	**WATER SUPPLY**: Water Supply Infrastructure from Hidkal Reservoir (Ghataprabha) to the proposed Industrial Node at Belagavi **(PHASE 1: 2017-22)**	KIADB,GoK	around INR 142 crs	Proposed as **Early Bird Project** as part of BMEC for Belagavi Node
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**2331**	
	MEDIUM TERM (2022-32)				
	1	**LAND ACQUISITION (2022-27)**	KSIIDC, GoK	around INR. 2157 crores	Land Acquisition for the node to be continued in this phase.
	2	**EXTERNAL INFRASTRUCTURE (2022-27)**			
	2.1	**RAIL**: Rail connectivity between Belagavi Node (Vantamuri land) & Mumbai-Bengaluru Rail line from Pachhapur Railway station as per Master Plan, 7 km	South Western Railways, MoR, GoI & GoK or BMEC SPV	around INR 70 Crore	Proposed as part of BMEC. Node based priority project for Belagavi Node
	2.2	**ROADS**: Up gradation of MDR road *(1L to 4L)* connecting NH4 to Belagavi Node (Vantamuriland parcel) as per Master Plan, 11km	PWD/KRDCL GoK	around INR 165 Crores	Proposed as part of BMEC for Belagavi Node
	2.3	**WATER SUPPLY**: Water Supply Infrastructure from Hidkal Reservoir (Ghataprabha) to the proposed Industrial Node at Belagavi **(Phase 2: 2022-27)**	KIADB,GoK	around INR 276 crs	Proposed as **Early Bird Project** as part of BMEC for Belagavi Node
	2.4	**ENERGY**: Dhabol- Bengaluru gas pipeline's Spur line from main trunk line (Belagavi Node lies on spur line from Gokak to Mormugao), 46 KMs long Gokak - Belagavi spur line & additional length of around 20 to 25 km to the Node from the city	GAIL & KSIIDC, GoK	Around INR 75 Crs .(Costing to be confirmed with GAIL)	Proposed as part of Phase II development of Dhabol-Bengaluru gas pipeline and the same is proposed to be extended to the Belagavi Node as part of BMEC for Belagvi Node
	3	**SITE DEVELOPMENT(2022-27)**	KSIIDC, GoK	around INR 2887 Crores	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	4	**SITE DEVELOPMENT(2027-32)**	KSIIDC, GoK	around INR 2152 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**7782**	
	LONG TERM (2032-41)				
	1	**SITE DEVELOPMENT(2032-37)**	KSIIDC, GoK	around INR 3590 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	2	**SITE DEVELOPMENT (2037-41)**	KSIIDC, GoK	around INR 3590 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
NODE DEVELOPMENT		TOTAL COST FOR LONG TERM PROJETCS (INR Crs)		7180	
		TOTAL COST FOR NODE (INR Crs)		17293	
	BALLARI NODE				
		SHORT TERM (2017-22)			
	1	LAND ACQUISITION (2017-22)	KSIIDC, GoK	around INR 502 Crore	Land Acquisition for the node to be initiated in this phase I as land cost is expected to escalate . (Recommended by GoK to be phased as Medium Term)
	2	SITE DEVELOPMENT(2017-22)	KSIIDC, GoK	around INR 350 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.(Recommended by GoK to be phased as Medium Term)
		TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)		852	
		MEDIUM TERM (2022-32)			
	1	LAND ACQUISITION (2022-27)	KSIIDC, GoK	around INR 510 Crore	Land Acquisition for the node to be continued in this phase.
	2	EXTERNAL INFRASTRUCTURE			
	2.1	RAIL: Rail connectivity between Ballari Node & Davanagere- Hospete Rail line from Hagaribomanahalli Railway station, 2.5 km	MoR, GoI & GoK	around INR 25 Crore	Proposed as part of BMEC.Node based priority project for Ballari
	2.2	ROADS: Upgradation of SH 40 from Ballari Node to NH 13 *(a part of proposed alternative expressway)* , 20km	PWD/KRDCL GoK	cost to be worked out	Proposed as part of BMEC.Node based priority project for Ballari Node
	2.3	WATER SUPPLY: Water Supply Infrastructure from Tungabhadra Reservoir to the proposed Industrial Node at Ballari, 12 km	KIADB,GoK	cost to be worked out	Proposed as **Early Bird Project** as part of BMEC for Ballari Node
	3	SITE DEVELOPMENT(2022-27)	KSIIDC, GoK	around INR 2589 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	4	SITE DEVELOPMENT (2027-32)	KSIIDC, GoK	around INR 2974 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
		TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)		6098	
		LONG TERM (2032-41)			
	1	SITE DEVELOPMENT (2032-37)	KSIIDC, GoK	around INR 3079 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	2	SITE DEVELOPMENT (2037-41)	KSIIDC, GoK	around INR 1155 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
		TOTAL COST FOR LONG TERM PROJETCS (INR Crs)		4234	
		TOTAL COST FOR NODE (INR Crs)		11184	
	HAVERI NODE				
		MEDIUM TERM (2022-32)			
	1	LAND ACQUISITION	KSIIDC, GoK	around INR 38 Crore	Land Acquisition for the node to be initiated in this phase.

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
NODE DEVELOPMENT	**2**	**SITE DEVELOPMENT(2022-27)**	KSIIDC, GoK	around INR 170 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	3	**LAND ACQUISITION:**	KSIIDC, GoK	around INR 109 Crore	Land Acquisition for the node to be continued in this phase.
	4	**EXTERNAL INFRASTRUCTURE**			
	4.1	**RAIL**: Rail connectivity between Haveri Node & Mumbai-Bengaluru Rail line from Haveri Railway station, 9 km	MoR, GoI & GoK	around INR 90 Crore	Proposed as part of BMEC.Node based priority project for Haveri
	4.2	**ROADS**: Upgradation of SH 2 from Haveri Node to NH 4, 10 km	PWD/KRDCL GoK	cost to be worked out	Proposed as part of BMEC.Node based priority project for Haveri Node
	4.3	**WATER SUPPLY**: Water Supply Infrastructure from Tungabhadra Reservoir to the proposed Industrial Node at Haveri, 65 km	KIADB,GoK	cost to be worked out	Proposed as part of BMEC.Node based priority project for Haveri Node
	4.4	**ENERGY**: Dhabol- Bengaluru gas pipeline's Spur line to the proposed Haveri Node, 55 km	GAIL & KSIIDC, GoK	Around INR 193 Crs .(Costing to be confirmed with GAIL)	Proposed as part of BMEC.Node based priority project for Haveri Node
	5	**SITE DEVELOPMENT (2027-32)**	KSIIDC, GoK	around INR 340 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**940**	
	LONG TERM (2032-41)				
	1	**SITE DEVELOPMENT (2032-37)**	KSIIDC, GoK	around INR 511 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	2	**SITE DEVELOPMENT (2037-41)**	KSIIDC, GoK	around INR 681 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR LONG TERM PROJETCS (INR Crs)			**1191**	
	TOTAL COST FOR NODE (INR Crs)			**2132**	
	HASSAN NODE				
	SHORT TERM (2017-22)				
	1	**LAND ACQUISITION (2017-22)**	KSIIDC, GoK	Around INR 257 crores	Land Acquisition for the node to be initiated in this phase I as land cost is expected to escalate .(Recommended by GoK to be phased as Medium Term)
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**257**	
	MEDIUM TERM (2022-32)				
	1	**LAND ACQUISITION (2022-27)**	KSIIDC, GoK	Around INR 741 crores	Land Acquisition for the node to be continued in this phase.
	2	**SITE DEVELOPMENT (2022-27)**	KSIIDC, GoK	Around INR 830 crores	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	3	**EXTERNAL INFRASTRUCTURE**			
	3.1	**ROADS**: Upgradation of road from SH 57 at Nagathavalli to Hassan Node, 3km *(SH 57 connects to NH 48, in turn improving the node connectivity to the NH)*	PWD/KRDCL GoK		Proposed as part of BMEC.Node based priority project for Hassan Node

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - KARNATAKA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
NODE DEVELOPMENT	3.2	**WATER SUPPLY**: Water Supply Infrastructure from Gorur Hemavathi Reservoir to the proposed Industrial Node at Hassan, 20 km	KIADB,GoK		Proposed as part of BMEC.Node based priority project for Hassan Node
	4	**SITE DEVELOPMENT (2027-32)**	KSIIDC, GoK	around INR 1246 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**2817**	
	LONG TERM (2032-41)				
	1	**SITE DEVELOPMENT (2032-37)**	KSIIDC, GoK	around INR 1246 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	2	**SITE DEVELOPMENT (2037-41)**	KSIIDC, GoK	around INR 830 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR LONG TERM PROJETCS (INR Crs)			**2076**	
	TOTAL COST FOR NODE (INR Crs)			**5150**	

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - MAHARASHTRA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
TRANSPORT- PORTS	**SHORT TERM (2017-22)**				
	1	Expansion of Dighi Port (Non Major Port) to 30 MT in 1st Phase	MMB,GoM and Balaji Group	around INR 1200 crores	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	2	Expansion of Dabhol Port (Non Major Port) to 10 MT	MMB,GoM and RGPPL	Cost to be confirmed with port management	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	3	Expansion of Jaigad Port (Dhamankhol Bay Non Major Port) to 50 MT	MMB,GoM and Jindal Group (JSW)	Cost to be confirmed with port management	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	4	Development of Jaigad Port (Lavgan Non Major Port) (5MT)	MMB,GoM and Chowgule Group	around INR 1000 crores	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	5	Expansion of Redi Port to 33 MT (Non Major Port)	MMB,GoM Earnest John Group of Companies	Cost to be confirmed with port management	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**2200**	
	MEDIUM TERM (2022-32)				
	1	Expansion of Dighi Port from 30 MT to 60 MT in 2nd Phase	MMB,GoM and Balaji Group	around INR 3500-4000 crores	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	2	Expansion of Dighi Port from 60 MT to 90 MT in 3rd Phase	MMB,GoM and Balaji Group	Cost to be confirmed with port management	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**4000**	
PORT CONNECTIVITY- RAIL & Tunnels/ Bridges	**SHORT TERM (2017-22)**				
	1	Karad-Chiplun- Jaigad port *160 km, New Line* ***Double line electrified*** **(DFC spur Line)**	Central Railways, MoR,GoI	around INR 2160 (additional 720 Crs for Tunnel + 40 Crs for Bridge)	Identified as **Early Bird Project for Satara, Sangli & Solapur Nodes** as part of BMEC. Connects Bengaluru- Mumbai rail link to Konkan line and then to ports. Konkan line (Digini to Jaigad Port link) is already sanctioned by MoR & being implemented through an SPV formed between MoR, MMB & JAIGAD PORT. The project is being explored by MoS as part of the Sagarmala Project.
	2	Pen-Thal *(Upgradation to Double line electrified, 29 km)*	Central Railways, MoR,GoI	around INR 305	Proposed as part of BMEC for Port connectivity to Rewas port from Konkan line.
	3	Thal-Rewas Port *(New Line, double line electrified, 20 km)*	Central Railways, MoR,GoI	around INR 510	Proposed as part of BMEC for Port connectivity to Rewas port from Thal.
	4	Bored Tunnel on Ghatmatha, *2L, 4.5 km*	Central Railways, MoR,GoI	around INR 720	Proposed as part of BMEC project on the Karad- Chiplun Rail link (Dabhol & Jaigad Port Connectivity), Integrated Tunnel
	5	Rail Bridge on SH 105 , *2L, 0.85 km*	Central Railways, MoR,GoI	around INR 40	Proposed as part of BMEC for Port connectivity to Jaigad ports., Integrated Bridge
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**4495**	
	MEDIUM TERM (2022-32)				
	1	Bored Tunnel on Varanda Ghat *(1km, 2L)*	Central Railways, MoR,GoI	around INR 160	Proposed as part of BMEC. Would act as port connectivity to Pune Node. Located on the Shirwal- Mahad- Dighi Line., Integrated Tunnel
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**160**	
PORT CONNECTIVITY- ROADS & TUNNELS/ BRIDGES	**SHORT TERM (2017-22)**				
	1	SH-78: Karad - Chiplun, 90 km (Upgradation to 4L)	MSRDC, GoM	around INR 810 crores	Proposed as **Early Bird Project** as part of BMEC for Satara Node to improve connectivity to Dabhol and Jaigad Ports from Karad on NH 4. The project is being explored by MoS as part of the Sagarmala Project.
		SH-78: Chiplun - Modka Agar (SH-4), *42 km(Upgradation to 2L)*		around INR 231 crores	
		SH- 4: Modka Agar - Dabhol Port & Jaigad Ports, *19 km (Upgradation to 2L)*		around INR 105 crores	

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - MAHARASHTRA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
PORT CONNECTIVITY-ROADS & TUNNELS/ BRIDGES	2	Pandharpur Fata - Gava Tala (SH-99), *14 km (Upgradation to 2L)*	MSRDC, GoM	around INR 77 crores	Proposed as **Early Bird Project** as part of BMEC for Pune Node to improve connectivity from Shindewadi near Pune city on NH 4 to Dighi Port.
		SH 99 & MDR : Gava Tala - Dighi port, *53 km (Upgradation to 2L)*		around INR 451 crores	
	3	SH 106: Nivali Fata (NH-17) - SH-4 (Undi) *(37 km, Upgradation to 2L)*	MSRDC, GoM	around INR 204	Proposed as part of BMEC to improve connectivity to Jaigad Ports from NH17.Connects NH204 from NH17 to Jaigad Port, i.e. connectivity of Kolapur district to Jaigad Ports.
		SH 4: SH-4 (Undi) - Jaigad Port *(5.5 km, Upgradation to 2L)*	MSRDC, GoM	around INR 30	
	4	NH 204 : Kolhapur- Ratnagiri, *137 km(Upgradation to 4L)*	National Highway Authority of India (NHAI), GoI	around 1233 crores	Already proposed by NHAI for 2 lane widening. Proposed as 4 lane as part of BMEC
	5	MDR: Indapur on NH-17 to Rajapuri (Dighi port) *(47.2 km, Upgradation to 2L)*	MSRDC, GoM	around INR 260	Proposed as part of BMEC **Early Bird Project** to improve connectivity between NH 17 and Dighi Port
	6	SH 105: Sawarde(NH17) to Jaigad Port *(47 km, Upgradation to 2L)*	MSRDC, GoM	around INR 259	Proposed as part of BMEC proposal to improve connectivity between NH 17 and Jaigad Ports.Alternative connectivity of Karad-Chiplun link from NH17 to Jaigad Port
	7	SH-134 (Sankeshwar (NH-4) - Tita, 63 km) , *Upgradation from 1L to 2L*	MSRDC, GoM	around INR 347 crores	Proposed as **Early Bird Project** under BMEC. Will facilitate development of both Belagavi & Kolhapur districts. Connects NH4 to NH17 and then to Redi Port. Total INR 1562 crores , Upgradation of 2 L to 4L in Phase 2.The project is being explored by MoS as part of the Sagarmala Project.
		SH-180/ SH-121 (Tita - Sawantwadi, 37 km) *Upgradation from 1L to 2L*		around INR 204 crores	
		SH-123 (Sawantwadi - Redi Port, 30 km) *Upgradation from 1L to 2L*		around INR 165 crores	
	8	Tunnel on Ghatmatha on SH 78 *(4.5 km, 2L)*	MSRDC, GoM	around INR 720	Tunnel Proposed as part of BMEC on the Karad-Chiplun to improve onnectivity to Dabhol Port., Integrated Tunnel
	9	Road Bridge on SH 105: *(0.85 km, 2L)*	MSRDC, GoM	around INR 40	Bridge Proposed as part of BMEC on SH 105 , to improve connectivity to Jaigad Ports, Integrated Bridge(along the alternative alignment for Karad-Chiplun link from NH17 to Jaigad Ports)
	10	Tunnel/ Realignement at Ambaghat on NH 204	National Highway Authority of India (NHAI), GoI	In detail study needs to be carried out. The tunnel would improve the connectivty to Ratnagiri Port from Kolhapur along the NH 204.	
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**5136**	
	MEDIUM TERM (2022-32)				
	1	SH-78: Chiplun - Modka Agar (SH-4),*42 km(Upgradation to 4L)*	MSRDC, GoM	around INR 273 crores	1st Phase proposed as Early Bird project as part of BMEC for Satara Node to improve connectivity to Dabhol and Jaigad Ports from Karad on NH 4.
		SH- 4: Modka Agar - Dabhol Port, *19 km (Upgradation to 4L)*		around INR 124 crores	
	2	SH 70 : Shindewadi (NH-4) - Pandharpur Fata , *108 km (Upgradation to 4L)*	MSRDC, GoM	around INR 972 crores	1st Phase proposed as Early Bird project as part of BMEC for Pune Node & Pune City to improve connectivity from Shindewadi on NH 4 to Dighi Port.
		Pandharpur Fata - Gava Tala (SH-99), *14 km (Upgradation to 4L)*		around INR 91 crores	
		SH 99 & MDR : Gava Tala - Dighi port, *53 km(Upgradation to 4L)*		around INR 345 crores	
	3	SH 106: Nivali Fata (NH-17) - SH-4 (Undi) *(37 km, Upgradation to 4L)*	MSRDC, GoM	around INR 241	Proposed as part of BMEC to improve connectivity to Jaigad Ports from NH17. Connects NH204 from NH17 to Jaigad Port, i.e. connectivity of Kolapur district to Jaigad Ports.
		SH 4: SH-4 (Undi) - Jaigad Port *(5.5 km, Upgradation to 4L)*	MSRDC, GoM	around INR 36	
	4	MDR: Indapur on NH-17to Rajapuri (Dighi port) *(47.2 km, Upgradation to 4L)*	MSRDC, GoM	around INR 307	1st Phase proposed as Early Bird Project as part of BMEC to improve connectivity to Dighi Port from NH 17.

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - MAHARASHTRA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
PORT CONNECTIVITY- ROADS & TUNNELS/ BRIDGES	5	SH 105: Sawarde(NH17) to Jaigad Port *(47 km, Upgradation to 4L)*	MSRDC, GoM	around INR 306	Proposed as part of BMEC proposal to improve connectivity between NH 17 and Jaigad Ports. Alternative connectivity of Karad-Chiplun link from NH17 to Jaigad Port
	6	SH-134 (Sankeshwar (NH-4) - Tita, 63 km) , *Upgradation from 2L to 4L*	MSRDC, GoM	around INR 410 crores	1st Phase proposed as Early Bird Project under BMEC. Will facilitate development of both Belagavi & Kolhapur districts. Connects NH4 to NH17 and then to Redi Port. The project is being explored by MoS as part of the Sagarmala Project.
		SH-180/ SH-121 (Tita - Sawantwadi, 37 km) , *Upgradation from 2L to 4L*		around INR 241 crores	
		SH-123 (Sawantwadi - Redi Port, 30 km) , *Upgradation from 2L to 4L*		around INR 195 crores	
	7	Bored Tunnel on Varanda Ghat on SH 70 *(1km, 2L)*	MSRDC, GoM	around INR 160	Proposed as part of BMEC. Is located across Western Ghats as part of Shirwal- Mahad - Dighi road link which d act as port connectivity to Dighi Port for Pune Node., Integrated Tunnel
	8	Road Bridge on SH 105: *(0.85 km, 4L)*	MSRDC, GoM	around INR 40	Bridge Proposed as part of BMEC on SH 105 , to improve connectivity to Jaigad Ports, Integrated Bridge (along the alternative alignment for Karad-Chiplun link from NH17 to Jaigad Ports)
	9	Tunnel on SH 99: Harkol Kond	MSRDC, GoM	Cost to be worked based on detailed study.	Realignment or Tunnel Options need to be Studied in Detail for improving connectivity to Dighi Port. Part of SH99 between Gava Tala to Dighi
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**3741**	
TRANSPORT- RAIL	**SHORT TERM (2017-22)**				
	1	Miraj-Pune *(Upgradation of 240 km existing line to be electrified double line)*	Central Railways, MoR,GoI	around INR 2520 crores	Proposed as High Speed Rail Line by Railways. Proposed as **Early Bird Project** as part of BMEC for Pune Node.
	2	Developing rail siding for the Satara node connecting to Bangalore Pune DFC	Central Railways, MoR,GoI	around INR 10 Crore/Km. Cost will be determined based on finalisation of node site location	Proposed as part of BMEC for Satara Node
	3	Baramati-Lonand-Shirwal-Mahad-Dighi line passing along Bhor Node, *250 km, New LineDouble line electrified*	Central Railways, MoR,GoI	around INR 3275 crores	Baramati - Lonanad section, single line, is already under implementation by CR. Connectivity between Roha (Konkan Line) and Dighi port is alreday sanction by MoR and would be implemented through SPV between MoR, MMB & Dighi Port.Remaining stretch is proposed as part of BMEC perspective. Identified as Priority project under Pune Node of BMEC .
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**6095**	
	MEDIUM TERM (2022-32)				
	1	Sangli- Satara-Pune *272 km* **(DFC)**	Dedicated Freight Corridor Corporation of India (DFCCIL), MoR, GoI	around INR 6937 crores	Proposed as part of Diamond Quadrilateral. DFC proposed as part of BMEC (Part of Banagalore Pune DFC).This project will enhance connectivity between Bengaluru & Mumbai and all the propose industrial nodes along the corridor.Proposed as part of Diamond Quadrilateral. And the same is identified as priority projects as part of BMEC. also identified as eraly bird project under Pune node)
	2	Kolhapur-Miraj-Sangole-Pandharpur-Kurduvadi, *235 km, Upgradation to electrified double line*	Central Railways, MoR,GoI	around INR 2468	Proposed as part of BMEC . Improves connectivity of Sangli and Solapur Nodes with Bangalore Pune DFC
	3	Daund (Kurukumbh) - Solapur-Kalaburagi, *300 km, Upgradation to electrified double line*	South Western Railways, CR Railways, MoR, GoI	around INR 1395	Proposed as part of BMEC to improve connectivity to Kalaburgi NIMZ from Bangalore Pune DFC
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**10800**	

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - MAHARASHTRA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
TRANSPORT-ROADS	**SHORT TERM (2017-22)**				
	1	Proposed Greenfield Expressway : Sira (Tumkur/ Bengaluru)- Bigwan (Pune) *(169 km, Phase 1 – 4Lane with 6L ROW. Starts by 2017 & opens by 2022 (Phase II-6 Lane)*	NHAI, MoRTH, GoI & Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 3120 crores	Proposed as part of BMEC to enhance and establish high speed road transport connectivity between Bengaluru to Mumbai via Pune and other proposed Nodes of the region and to ease the forecasted traffic pressure on NH4 by 2020-25. Proposed with a design speed of 120 kms/ hr with access controls.
	2	6 laning of NH4 stretch between Kolhapur- Satara- Pune, *223 km*	National Highway Authority of India (NHAI), GoI	around INR 2343 Crores	Proposed as part of BMEC and would facilitate development of Kolhapur,Satara and Pune Node. Proposed as part of BMEC and would facilitate development of Kolhapur,Satara and Pune Node and its connectivity to other nodes of the region and spur lines to ports.
	3	NH 9: Solapur- Kurkumbh- Pune, *260 km (Upgradation from 4L to 6L)*	National Highway Authority of India (NHAI), GoI	around INR 2730 crores	Proposed as part of BMEC for Pune Node. Improves connectivity between Bidar NIMZ and NH 4 through Solapur and Pune Node, Mumbai and ports of western coast of Maharashtra . It would also facilitate proposed Bidar NIMZ
	4	SH 58: Pingali- Mhaswad *(upgradation to 2L), 28 km*	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 154 crores	Proposed as **Early Bird Project** as part of BMEC for Satara Node. Connectivity between NH 4 and Satara Node
	5	Pune Ring Road *(161 km , 6L with service roads on both sides)*	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 10,400 crores	Proposed by MSRDC and approved by GoM. Proposed as **Early Bird Project** as part of BMEC fro Pune Node.
	6	Upgradation of Karad - Vaduj- Pingali Road (Connectivity from Satara Node to Karad - Chiplun SH 78) Airport Connectivity to Karad Airport	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 477 Crores	Proposed as **Early Bird Project** as part of BMEC for Satara Node to improve connectivity to Karad Airport.
	7	Upgradation of SH 146 (Pusegaon- Vaduj Road) passing through Satara node	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 176 Crores	Proposed as **Early Bird Project** as part of BMEC for Satara Node
	8	Upgradation of Dahiwadi- Phaltan Road to Phaltan Airport from Satara Node (Maan Khatav) to 2L, 45 km **(phase 1)**	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 248 crores	Proposed as part of BMEC for Satara Node & also to Pune Node (depending on the finalised location) to improve connectivity to Phaltan airport.
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**19648**	
	MEDIUM TERM (2022-32)				
	1	SH 58: Pingali- Mhaswad (*(upgradation to 4L), 28 km*	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 540 crores	Proposed as part of BMEC for Satara Node. **1st Phase proposed as Early Bird Project.** Connectivity between NH 4 and Proposed Expressway.
	2	Upgradation of Dahiwadi- Phaltan Road to Phaltan Airport from Satara Node (Maan Khatav) from 2L to 4L, 45 km **(phase 2)**	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 293 crores	1st Phase proposed as Early Bird Projectas part of BMEC for Satara Node to improve connectivty to Phaltan airport
	3	NH 204/ SH 3: Kolhapur-Sangli-Kamalapur (*130 km, Upgradation from 2L to 4L)*	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 1170	Proposed as part of BMEC to improve connectivity between NH 4 and NH 9 through Solapur and Sangli Nodes
		Kamalapur-Sangola *(8 km, existing 4L)*			
		Sangola - Ghatne (NH-9) *(70 km, Upgradation from 2L to 4L)*		around INR 630	
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**2275**	
TRANSPORT- PORTS	**SHORT TERM (2017-22)**				
	1	Expansion of Dighi Port (Non Major Port) to 30 MT in 1st Phase	MMB,GoM and Balaji Group	around INR 1200 crores	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	2	Expansion of Dabhol Port (Non Major Port) to 10 MT	MMB,GoM and RGPPL	Cost to be confirmed with port management	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	3	Expansion of Jaigad Port (Dhamankhol Bay Non Major Port) to 50 MT	MMB,GoM and Jindal Group (JSW)	Cost to be confirmed with port management	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - MAHARASHTRA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
TRANSPORT- PORTS	4	Development of Jaigad Port (Lavgan Non Major Port) (5MT)	MMB,GoM and Chowgule Group	around INR 1000 crores	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	5	Expansion of Redi Port to 33 MT (Non Major Port)	MMB,GoM Earnest John Group of Companies	Cost to be confirmed with port management	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**2200**	
	MEDIUM TERM (2022-32)				
	1	Expansion of Dighi Port from 30 MT to 60 MT in 2nd Phase	MMB,GoM and Balaji Group	around INR 3500-4000 crores	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	2	Expansion of Dighi Port from 60 MT to 90 MT in 3rd Phase	MMB,GoM and Balaji Group	Cost to be confirmed with port management	Expansion/ Capacity addition was already planned by the respective port management and the same is expected to meet BMEC's demand
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**4000**	
TRANSPORT- AIRPORTS	**SHORT TERM (2017-22)**				
	1	New Pune International Airport	Airports Authority of India (AAI)	around INR 1000 crores	Located along Pune- Nashik NH 50 , near Rajgurunagar. Spread across 1800 hectares. Project is already proposed by AAI and the same is identified under BMEC as priority project
	2	Greenfield Airport for Solapur at Boramani village	Airports Authority of India (AAI), GoI & Maharashtra Airport development Company (MADC), GoM	around INR 250 crores (cost to confirmed by MADC)	AAI is already in the process of developing the Greenfield Airport for Solapur in JV with MADC, GoM,
	3	Upgradation of Karad Airport	Maharashtra Airport development Company (MADC)	cost to confirmed by MADC	Already proposed by MADC and the same was idnetified as part of BMEC to facilitate Sangli & Satara Nodes and logistic hub at Karad
	4	Upgradation of Phaltan Airport	Maharashtra Airport development Company (MADC)	cost to confirmed by MADC	Already proposed by MADC and the same was idnetified as part of BMEC to facilitate Sangli & Satara Nodes and logistic hub at Karad
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**1000**	
ENERGY	**By 2041 , the Maharashtra Region of BMEC will have an additional power demand of 14301 MW which is proposed to be met by 4 Wind Power Plants of 120 MW capacity, 1 SHP of 25 MW capacity, 3146 MW to be met by Solar power plants, 2 UMPPs of 4000 MW capacity, 3.5 STPS of 1000 MW capacity and 3 Gas based power plants of 700 MW capacity.**				
	SHORT TERM (2017-22)				
	By 2017,Maharashtra would have an additional demand of 509 MW which is proposed to be met by 41 MW to be met by solar power plants (around INR 281 crores) , 0.5 STPS (around INR 3250 crores) and 1 Gas based power plants (around INR 2540crores)				
	The other power projects already proposed in the region are listed below				
	1	2500 MW Gas Based Power Plant at Navlakh Umbre, Pune	Hiranandani Group	INR 11,000- 12,000 crores	The project would facilitate the power demand of Pune district of BMEC region.The project will be funded at 75:25 debt equity. The group has around 200 acres of land at Navlakh Umbre Village. The first Phae will have 355 MW capacity. The project has got a stay order due to environmental issues.
	2	1050 MW Coal Based Power Plant in Dhakur/ Ajgaon, Sindhudurg	Ind- Barath Power (Konkan) Ltd	cost is yet to be confimred	This project would facilitate power demand of the Port & Posrt based development in Sindudurg district and also the Kolhapur part of BMEC region. Land is estimated be around 450 acres
	3	1320 MW Coal Based Thermal Power Plant near Solapur	National Thermal Power Corporation (NTPC)	INR 12,500 crores	This project will fcailitate the development of Solapur Node & Sangli Node. NTPC has around 1,893 acres of land at Fatatewadi, Hotgi and Aherwadi village near Solapur and the same will be utilised for this power project other expansion plans
	4	800 MW Gas based combined Cycle Power Plant at Kurkumbh , Pune	Reliance Industries	cost is yet to be confimred	The project would facilitate the power demand of Pune district of BMEC region.Land Requirement of 80-90 acres, reliance has mobilised around 50 acres.

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - MAHARASHTRA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
ENERGY	5	2100 MW Gas Based Thermal Power Plant at Vangni Tarfe, Raigad	Urban Energy Generation Pvt Ltd	INR 6510 crores	The project involves setting up of 2100 MW (6×350 MW) Combined Cycle Power Plant. The plant is to be implemented in three phases of 2×350 MW each.
	6	2100 MW Gas based Thermal Power plant at Roha, Raigad	Urban Energy Generation Pvt Ltd	cost is yet to be confimred	Would facilitate to meet the power demand of Pune Node and its allied industrial & infrastructure requirments
	7	1600 MW Coal based Dehrand Power Plant at Dehrand and Shahpur villages, Raigad	Tata Power	cost is yet to be confimred	(2X 800 MW).All statutory clearances required to start the project have been obtained including Ministry of Environment & Forest (MoEF) clearance. Land required for the project is about 461 Ha and is currently being acquired through the Maharashtra Industrial Development Corporation (MIDC). So far, more than 50% of the land has been acquired and compensation to PAFs is fully paid. This project would also facilitate to meet the power demand of the region
	8	1980 MW Coal based Thermal Power Station at Dhopave, Ratnagiri	Mahagenco, GoM	cost is yet to be confimred	Loacted within MIDC's Veldur Industrial Area, Ratnagiri district.
	9	2000 MW Power Plant in Guhagar, Ratnagiri	Tiana Power Projects Pvt Ltd	cost is yet to be confimred	The land acquisition process is in progress.
	10	1500 MW Power Plant in Anjarle, Ratnagiri	Tiana Power Projects Pvt Ltd	cost is yet to be confimred	
NODE DEVELOPMENT	**PUNE NODE**				
	SHORT TERM (2017-22)				
	1	**LAND ACQUISITION**	MIDC, GoM	around INR 2491 crores	Land Acquisition for the node to be initiated in this phase.
	2	**SITE DEVELOPMENT**	MIDC, GoM	around INR 592 crores	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**3083**	
	MEDIUM TERM (2022-32)				
	1	**LAND ACQUISITION:**	MIDC, GoM	around INR 5628 crores	Land Acquisition for the node to be continued in this phase.
	2	**EXTERNAL INFRASTRUCTURE**			
	2.1	**WATER SUPPLY**: Water Supply Infrastructure from Ujani Reservoir (5km)/ Nira River (40km) to proposed Industrial Node in Pune (Indapur) **Phase 1 (2017-22)**	MIDC, GoM	around INR 156 / INR 458 crores	Proposed as **Early Bird Project** as part of BMEC for Pune Node
	2.2	**WATER SUPPLY**: Water Supply Infrastructure from Ujani Reservoir (5km)/ Nira River (40km) to proposed Industrial Node in Pune (Indapur) **Phase 2 (2022-27)**	MIDC, GoM	around INR 260 / 277 crores	1st Phase proposed as Early Bird project as part of BMEC for Pune Node
	3	**SITE DEVELOPMENT (2022-27)**	MIDC, GoM	around INR 3419 crores	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	4	**SITE DEVELOPMENT (2027-32)**	MIDC, GoM	around INR 4011 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	5	**EXTERNAL INFRASTRUCTURE**			
	5.1	**WATER SUPPLY**: Water Supply Infrastructure from Ujani Reservoir (5km)/ Nira River (40km) to proposed Industrial Node in Pune (Indapur) **Phase 3 (2027-32)**	MIDC, GoM	around INR 361 / 636 crores	1st Phase proposed as Early Bird project as part of BMEC for Pune Node
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			**13835**	
	LONG TERM (2032-41)				
	1	**SITE DEVELOPMENT (2032-37)**	MIDC, GoM	around INR 7041 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - MAHARASHTRA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
NODE DEVELOPMENT	2	**SITE DEVELOPMENT (2037-41)**	MIDC, GoM	around INR 6691 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR LONG TERM PROJETCS (INR Crs)			**13732**	
	TOTAL COST FOR NODE (INR Crs)			**30649**	
	SATARA NODE				
	SHORT TERM (2017-22)				
	1	**LAND ACQUISITION**	MIDC, GoM	around INR 866 crores	Land Acquisition for the node to be initiated in this phase.
	2	**EXTERNAL INFRASTRUCTURE**			
	2.1	**RAIL**: Developing rail siding for the Satara node connecting to Bangalore Pune DFC, 25 km *(Proposed as part of BMEC for Satara Node)*	Central Railways, MoR,GoI	around INR 250 crores (INR 10 Crore/Km)	Provision of rasil link to the node from existing rail line, identified as priority project for Satara Node
	2.2	**ROADS**: SH 58: Satara - Pingali *(upgradation to 2L), 55 km*	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 303 crores	Proposed as **Early Bird Project** as part of BMEC for Satara Node. Connectivity between NH 4 and Satara Node proposed as Early Bird Project as part of BMEC for Satara Node. This road will connect the node to NH4 towards the west and proposed Expressway towards east.
	2.3	**WATER SUPPLY**: Water Supply Infrastructure from Shivsagar Reservoir to proposed Industrial Node in Satara (Man, Khatav- 70km) **Phase 1 (2017-22)**	MIDC, GoM	around INR 604.96	Proposed as part of BMEC for Satara Node
	2.4	**ENERGY**: Spur line of Gas pipeline to Satara Node from proposed Kolhapur- Satara Trunk line *(proposed as part of BMEC)*	GAIL, GoI	around INR 172 Crs .(Costing to be confirmed with GAIL)	Proposed as part of BMEC for Satara Node
	3	**SITE DEVELOPMENT**	MIDC, GoM	around INR 3213 crores	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR SHORT TERM PROJETCS (INR Crs)			**5410**	
	MEDIUM TERM (2022-32)				
	1	**EXTERNAL INFRASTRUCTURE**	MIDC, GoM		
	1.1	**ROADS**: SH 58: Satara - Pingali *(upgradation to 4L), 55 km*	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 358 crores	Proposed as **Early Bird Project** as part of BMEC for Satara Node. Connectivity between NH 4 and Satara Node
	1.2	**WATER SUPPLY**: Water Supply Infrastructure from Shivsagar Reservoir to proposed Industrial Node in Satara (Man, Khatav- 70km) **Phase 2 (2022-27)**	MIDC, GoM	around INR 132	Proposed as part of BMEC for Satara Node
	2	**SITE DEVELOPMENT (2022-27)**	MIDC, GoM	around INR 2132 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	3	**SITE DEVELOPMENT(2027-32)**	MIDC, GoM	around INR 711 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - MAHARASHTRA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
NODE DEVELOPMENT	4	**EXTERNAL INFRASTRUCTURE**			
	4.1	**WATER SUPPLY**: Water Supply Infrastructure from Shivsagar Reservoir to proposed Industrial Node in Satara (Man, Khatav- 70km) **Phase 3 (2027-32)**	MIDC, GoM	around INR 621	Proposed as part of BMEC for Satara Node
		TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)		**3953**	
		TOTAL COST FOR NODE (INR Crs)			
	SOLAPUR NODE				
		MEDIUM TERM (2022-32)			
	1	**LAND ACQUISITION (2022-27)**	MIDC, GoM	around INR 307 crores	Land Acquisition for the node to be initiated in this phase.
	2	**SITE DEVELOPMENT (2022-27)**	MIDC, GoM	around INR 2679 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	3	**EXTERNAL INFRASTRUCTURE**			
	3.1	**WATER SUPPLY**: Water Supply Infrastructure from Ujjani Reservoir / Bheema River to the proposed Industrial Node at Solapur at Mandrup (Establishment of 96 km/5km long water supply infrastructure to the node)**Phase 1 (2022-27)**	MIDC, GoM	around INR 732/ INR 92 Crore	
	4	**LAND ACQUISITION (2027-32)**	MIDC, GoM	around INR 1039 crores	Land Acquisition for the node to be continued in this phase.
	5	**EXTERNAL INFRASTRUCTURE**			
	5.1	**RAIL**: Rail connectivity between Solapur Node at Mandrup & Pune-Kalaburgi Rail line from Solapur Railway station, 12 km	MoR, GoI & GoM	around INR 120 crores (10 Crore/Km (1 Phase)	Proposed as part of BMEC for Solapur Node
	5.2	**ENERGY**: Extension of spur line (from Dhabol- Bengaluru gas trunk line)from Sangli to Solapur Node,102km	GAIL , GoI	around INR 408 Crs .(Costing to be confirmed with GAIL)	Proposed as part of BMEC for Solapur Node
	5.3	**WATER SUPPLY**: Water Supply Infrastructure from Ujjani Reservoir / Bheema River to the proposed Industrial Node at Solapur at Mandrup (Establishment of 96 km/5km long water supply infrastructure to the node) **Phase 2 (2027-32)**	MIDC, GoM	around INR 76/ 66 Crore	
	6	**SITE DEVELOPMENT (2027-32)**	MIDC, GoM	around INR 3494 crores	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
		TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)		**8204**	
		LONG TERM (2032-41)			
	1	**SITE DEVELOPMENT(2032-37)**	MIDC, GoM	around INR 2444Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	2	**SITE DEVELOPMENT (2037-41)**	MIDC, GoM	around INR 1629 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	3	**EXTERNAL INFRASTRUCTURE**			
	3.1	**WATER SUPPLY**: Water Supply Infrastructure from Ujjani Reservoir / Bheema River to the proposed Industrial Node at Solapur at Mandrup (Establishment of 96 km/5km long water supply infrastructure to the node) **Phase 3(2037-41)**	MIDC, GoM	INR 717/ 353 crores	Proposed as part of BMEC for Solapur Node
		TOTAL COST FOR LONG TERM PROJETCS (INR Crs)		**4776**	

BMEC PERSPECTIVE PLAN - PRIORITY PROJECTS - MAHARASHTRA REGION

Sector	Sl.No.	Project Name	Concerned Department/Implementing Agency	Estimated Preliminary Project Cost(in Rs. Crores) & Phasing	Remarks
NODE DEVELOPMENT	TOTAL COST FOR NODE (INR Crs)			12980	
	SANGLI NODE				
	MEDIUM TERM (2022-32)				
	1	**LAND ACQUISITION (2022-27)**	MIDC, GoM	around INR 229 crores	Land Acquisition for the node to be initiated in this phase.
	2	**SITE DEVELOPMENT(2022-27)**	MIDC, GoM	around INR 558 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	3	**EXTERNAL INFRASTRUCTURE**			
	3.1	**WATER SUPPLY**: Water Supply Infrastructure from Thakari LIS to the proposed Industrial Node at Sangli (Atpadi) , 10 km , **Phase 1 (2022-27)**	MIDC, GoM	around INR 95	Proposed as part of BMEC for Sangli Node
	4	**LAND ACQUISITION (2027-32)**	MIDC, GoM	around INR 777 crores	Land Acquisition for the node to be continued in this phase.
	5	**EXTERNAL INFRASTRUCTURE**			
	5.1	**RAIL:** Rail connectivity between Sangli Node (Atpadi) to Kolhapur-Kurduvadi Rail line from Sangole station,30km	MoR, GoI & GoM	around INR 10 Crore/Km (1 Phase)	Proposed as part of BMEC for Sangli Node
	5.2	**ROADS**: Upgradation of SH 76 from Sangli Node (Atpadi) to proposed expressway , 4 km (Upgradation to 4L) in 2 phases	Maharashtra State Road Development Corporation Ltd. (MSRDC), GoM	around INR 36 crores	Proposed as part of BMEC for Sangli Node
	5.3	**WATER SUPPLY**: Water Supply Infrastructure from Thakari LIS to the proposed Industrial Node at Sangli (Atpadi) , 10 km , **Phase 2 (2027-32)**	MIDC, GoM	around INR 33	Proposed as part of BMEC for Sangli Node
	5.4	**ENERGY:** EExtension of spur line (from Dhabol- Bengaluru gas trunk line) to the proposed Sangli Node from Sangli , 102 km	GAIL , GoI	around INR 408 Crs .(Costing to be confirmed with GAIL)	Proposed as part of BMEC for Sangli Node
	6	**SITE DEVELOPMENT (2027-32)**	MIDC, GoM	around INR 1116 crores	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR MEDIUM TERM PROJETCS (INR Crs)			3552	
	LONG TERM (2032-41)				
	1	**SITE DEVELOPMENT (2032-37)**	MIDC, GoM	around INR 1674 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	2	**EXTERNAL INFRASTRUCTURE**			
	2.1	**WATER SUPPLY**: Water Supply Infrastructure from Thakari LIS to the proposed Industrial Node at Sangli (Atpadi) , 10 km , **Phase 3(2032-37)**	MIDC, GoM	around INR 346	Proposed as part of BMEC for Sangli Node
	3	**SITE DEVELOPMENT (2037-41)**	MIDC, GoM	around INR 2233 Crore	This includes internal infrastructure within the node like road networks, water supply line, captive power plants etc.
	TOTAL COST FOR LONG TERM PROJETCS (INR Crs)			4253	
	TOTAL COST FOR NODE (INR Crs)			7805	

17.2 Investment Phasing of BMEC Region

Total investment required to achieve the development scenario outlined in the BMEC perspective Plan till 2041 (25 years plan period) is about **INR 325,172 crores (52 Billion USD)**. **Karnataka State Share of the total investments required in BMEC is about INR 204,824 crores (32.8 Billion USD), 63% & Maharashtra State is about INR 120,348 crores (19.2 Billion USD) which is around 37% of the total investment requirement.**

The following illustration and table explains the State wise and Sector wise share of BMEC's total investment requirements.

Figure: State Wise and Sector wise investment in BMEC region

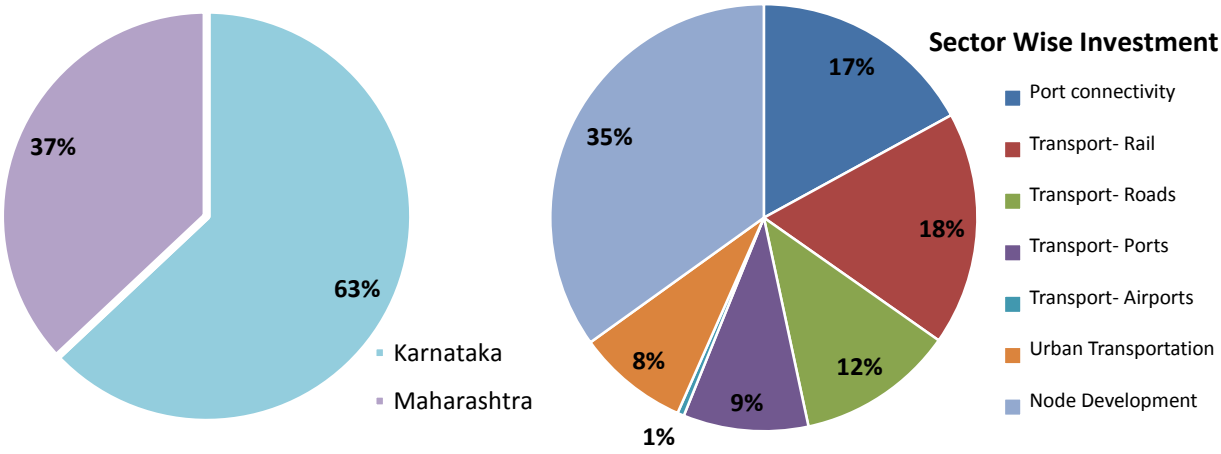


Table: Total Investment requirements for BMEC Perspective Plan (BMEC crore region) (in INR crores)

Sector	Investment (in INR crores)
Port connectivity	55,376
Transport- Rail	57,576
Transport- Roads, Tunnels and Bridges	38,726
Transport- Ports	30,797
Transport- Airports	1,648
Urban Transportation	27,510
Node Development	113,539
Total	**325, 172**

Source: Egis

17.2.1 Investment Phasing

All the infrastructure priority projects are categorized as per the proposed development phases and accordingly the investment towards development of these projects is categorized under three major phases as **Short, Medium & Long Term** investments.

- **Short Term Investments:** Total short term investment requirement with five year target period (2017 – 2022), is around **INR 111,501 Crores (17.8 Billion USD),** which accounts to be **34.3 %** of total BMEC's investment requirement
- **Medium Term Investments:** Total Medium term investment requirement with 10 year target period (2022 – 2032), is around **INR 155,450 Crores** (**24.9 Billion USD**), which accounts to be **47.8%** of total BMEC's investment requirement
- **Long Term Investments:** Total long term investment requirement for the remaining project period (2032 – 2041), is around **INR 58,221 Crores** (**9.3 Billion USD**), which accounts to be **17.9 %** of total BMEC's investment requirement

The following illustration and table explains the share of total BMEC's investment requirement under each of the three phases and also indicates the sector wise share of each of the Phase:

Figure: State wise comparison of Short, Medium and Long term investments

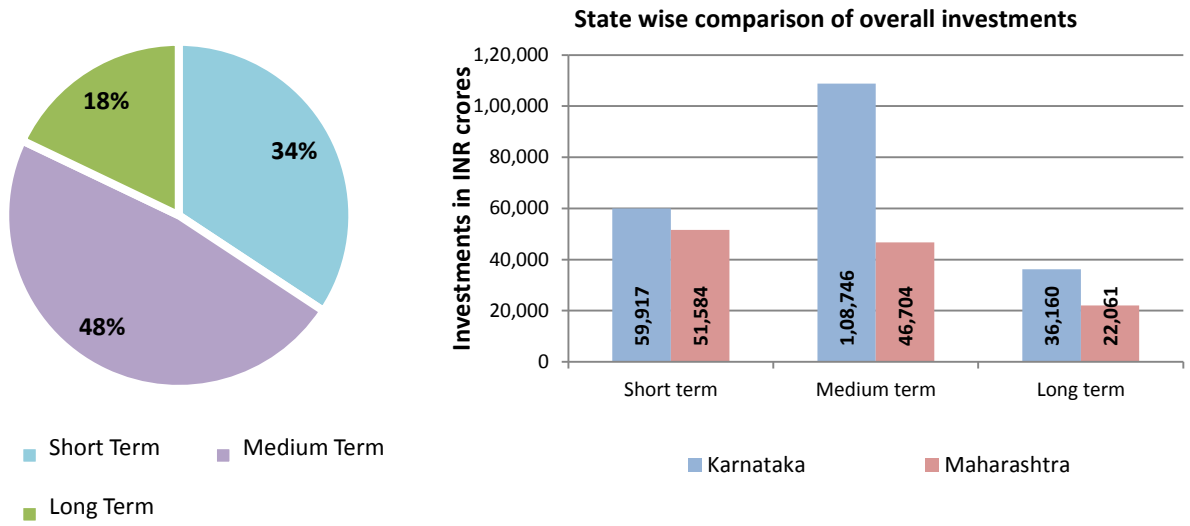
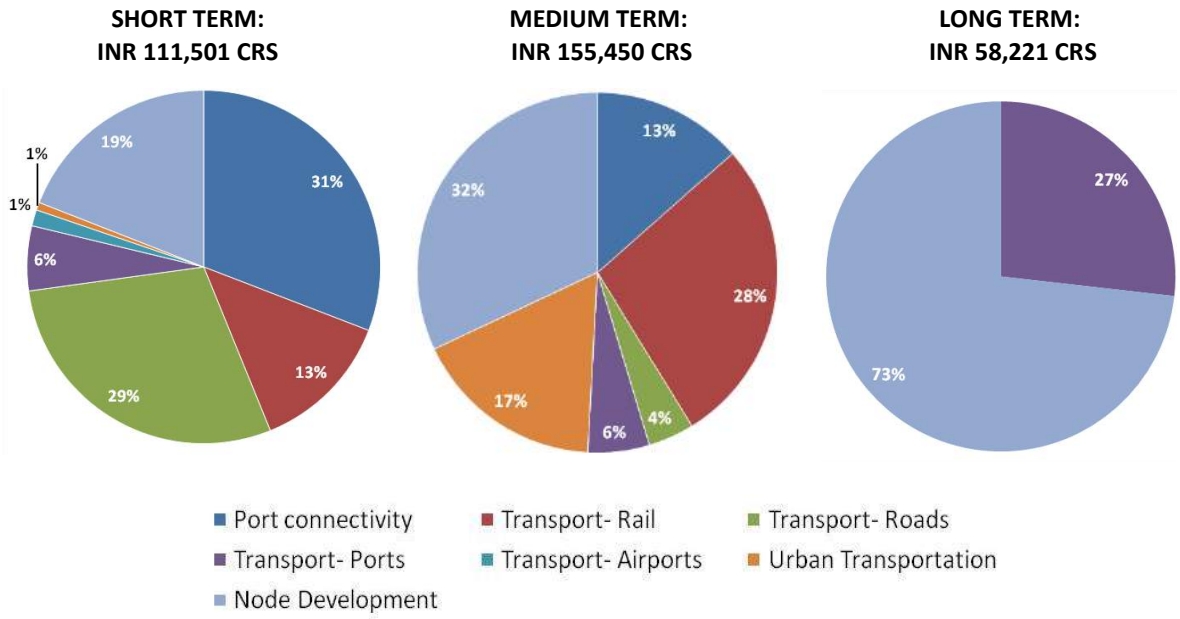


Table: Sector wise total Short, Medium and Long term Investment requirements for BMEC

Sector	Investment (in INR crores)			
	Short term	Medium term	Long term	Total
Port connectivity	34,397	20,979	0	55,376
Transport- Rail	14,497	43,079	0	57,576
Transport- Roads	32,309	6,417	0	38,726
Transport- Ports	6,610	8,590	15,597	30,797
Transport- Airports	1,648	0	0	1,648
Urban Transportation	800	26,710	0	27,510
Node Development	21,240	49,675	42,624	113,539
Total BMEC	**111,501**	**155,450**	**58,221**	**325,172**

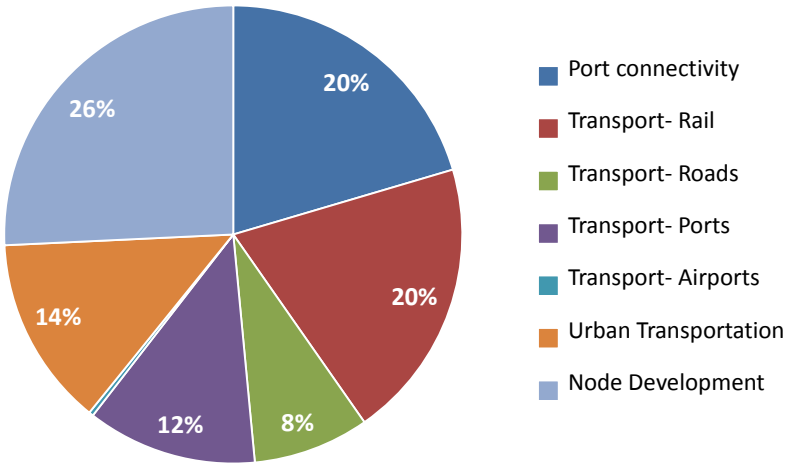
Source: Egis



17.3 State Wise Share of Investment Phasing- Karnataka

Karnataka State Share of the total investments required in BMEC is about INR 204,824 crores (32.8 Billion USD) which accounts for 63% of the total investment requirement of BMEC Perspective Plan. The following illustration and table explains sector wise Karnataka State share of BMEC's total investment requirements.

Figure: Sector wise investment in the State of Karnataka



Source: Egis

Table: Total Investment requirements for the State of Karnataka

Sector	Investment (in INR crores)
Port connectivity	41844
Transport- Rail	40681
Transport- Roads, Tunnels and Bridges	16803
Transport- Ports	24597
Transport- Airports	648

Urban Transportation	27510
Node Development	52741
Total	**204,824**

17.3.1 Investment Phasing

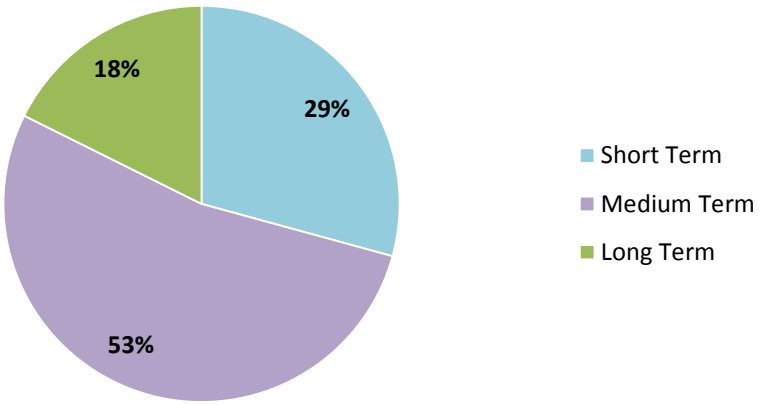
All the infrastructure priority projects are categorized as per the proposed development phases and accordingly the investment towards development of these projects is categorized under three major phases as **Short, Medium & Long Term** investments. The following illustration and table explains the share Karnataka State of investment requirement under each of the three phases and also indicates the sector wise share of each of the Phase:

Table: Sector wise total Short, Medium and Long term Investment requirements for Karnataka

Sector	Investment (in crores)		
	Short term	Medium term	Long term
Port connectivity	24766	17078	-
Transport- Rail	8402	32279	-
Transport- Roads	12661	4142	-
Transport- Ports	4410	4590	15597
Transport- Airports	648	-	-
Urban Transportation	800	26710	-
Node Development	8230	23947	20563
Total BMEC	59917	108746	36160

Source: Egis

Figure: Share of Short Term, Medium Term and Long Term Investments, Karnataka

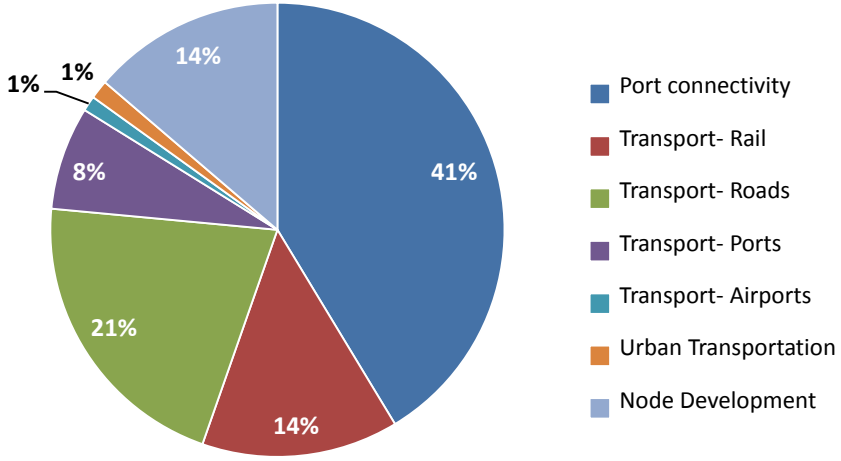


Source: Egis

Short Term Investment

The total short term investment requirement with five year target period (2017 – 2022), is around **INR 59,917 Crores** (**9.6 Billion USD**), which accounts to be **53.7 %** of total BMEC's Short term investment requirement.

Figure: Sector Wise Share of Short Term Investments, Karnataka



Source: Egis

The sector wise break-up of Short Term Investment Requirement is as follows:

- Port & Port connectivity sectors together accounts to the maximum share of 49 % of Short Term Investment requirement of BMEC. Port Connectivity sector alone accounts to INR 24,766 Crores (3.8 Billion USD), which is 41% of the overall Short Term Investment requirements. This also accounts to be around 8% of total investment requirement of BMEC.

- Second major share of short term investment requirement is under Road sector projects which demands INR 12,661 Crores (2 Billion USD) in the initial 5 years of the project period, which accounts to be 21% of the total Short Term Investment Requirement. As discussed earlier, proposed Greenfield Expressway from Sira (Tumakuru/ Bengaluru) to Bigwan (Pune) is INR 7,696 Crores (1.2 Billion USD), accounts for about 61% of the total short term investment under this Sector.

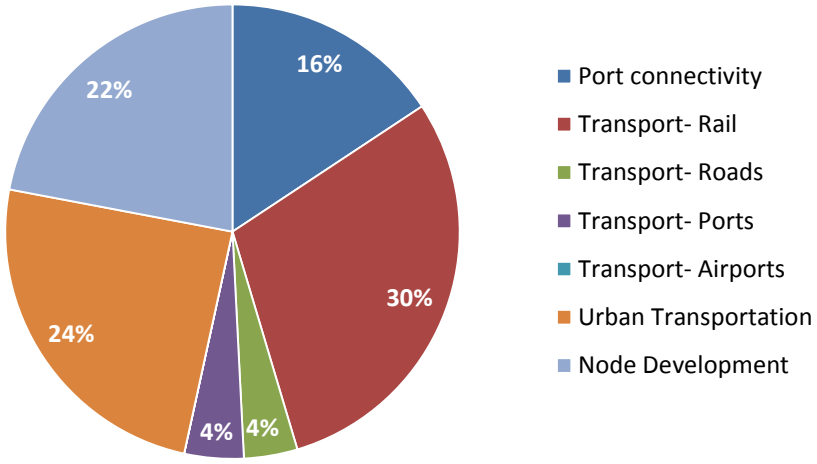
- Rail sector accounts for INR 8402 crores (1.2 Billion USD) which is about 14% of the total short term investment requirements. Tumakuru-Chitradurga-Davanagere , 256 km long new line, proposed as Double lining with electrification accounts for major share of about INR 2,688 crores (0.4 Billion USD) which is 32 % of the total short term investment requirements.

- The share of investment towards node development in Short Term period is only 13.7% with INR 8,230 Crores (1.2 Billion USD) of investment requirement for a period of 2017-22 in the State of Karnataka. Major share of short term investment requirement in Karnataka is attributed to the development of **Dharwad Node** which is **INR 3,613 Crores** (**0.6 Billion USD**) followed by **Belgavi Node** which is **INR 2,331 Crores** (**0.4 Billion USD**). Bellary, Chitradurga/Davanagere and Hassan nodes together accounts for INR 2,286 Crores (0.4 Billion USD).
- Together Urban Transportation and Airport sector accounts for 2.4% of the total short term investments in Karnataka with about INR 800 Crores and INR 648 Crores respectively.

Medium Term Investments

Total Medium term investment requirement with 10 year target period (2022 – 2032), is around **INR 108,746 Crores** (**17.4 Billion USD**), which accounts to be **53.1% of total investment requirement of the State** of Karnataka

Figure: Sector Wise Share of Medium Term Investments, Karnataka



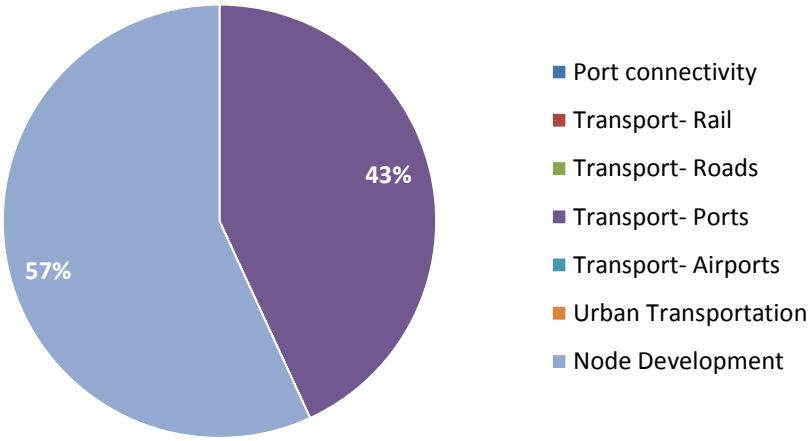
The sector wise break-up of Medium Term Investment Requirement is as follows:

- **Rail sector accounts** for **29.7%** of the total medium term investment requirements in which **INR 14,562 Crores** (**2.3 Billion USD**) is for proposed **Bengaluru-Mumbai Dedicated Freight Corridor (DFC)** of about 45.1%. This also accounts for **67.8% of the total project cost** which is INR 21,499 Crores (3.4 Billion USD).
- **Urban transportation sector** share is about **24.6%** in which **Metro Projects** proposed in **Dharwad district** connecting Durgadekeri-Belur-Dharwad-Hubli City - Hubli Airport and in **Belagavi district** connecting Vantamuri - Belagavi City- Belagavi Airport is about **INR 26,250 Crores** (**4.2 Billion USD**) covers **98%**
- **Node development** cost has share of **22%** under Medium Term investment in which Belgaum node accounts for a major share of about **INR 7,782 Crores** (**1.2 Billion USD**), **32.5%** of the total cost under Node development sector in Medium term investment
- **Port & Port connectivity sectors together** accounts for **19.9%** of total medium Term Investment requirement of BMEC in which **NH 234: Banavara - Mangaluru Port** upgradation requires an estimated investment of **INR 2,592 Crores** (**0.4 Billion USD**)
- **Roads sector** accounts for about **3.8%** of the total Medium Term investments. Development of Outer **Peripheral Ring Road at Belagavi City** accounts for about **INR 986 Crores** which has the major share in this sector for Medium term investments.

Long Term Investments

Total long term investment requirement with remaining project period (2032 – 2041), is around **INR 36,160 Crores** (**5.8 Billion USD**), which accounts to be 17.7 % of total BMEC's investment requirement in the State of Karnataka

Figure: Sector Wise Share of Long Term Investments, Karnataka



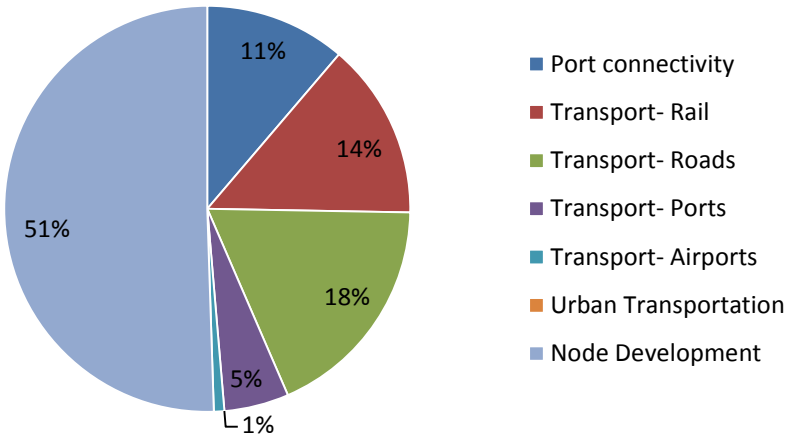
The sector wise break-up of Long Term Investment Requirement is as follows:

- Node Development is the major component of Long term investment which requires about INR 20,563 Crores (3.3 Billion USD), represents **39.0% of the overall Node development investment requirement**. **Belgavi Node** has the maximum share which is about **INR 7,180 Crores** (**1.1 Billion USD**) followed by **Bellari node** which accounts for **INR 4,234 Crores** (**0.7 Billion USD**)
- **Ports sector** account for INR 15,597 Crores (2.5 Billion USD) which is about 44% of the long term investment requirement and **63.4% of the overall Port sector investment requirements in Karnataka**. Development of **Haldipur Greenfield Port** accounts for major share in this segment which is about **INR 9,000 Crores** (**1.4 Billion USD**).

17.4 State Wise Share of Investment Phasing- Maharashtra

Maharashtra State Share of the total investments required in BMEC is about INR 120,348 crores (19.3 Billion USD) which accounts for 37% of the total investment requirement of BMEC Perspective Plan.

Figure: Sector wise investment in Maharashtra



Source: Egis

Table: Total Investment requirements for Maharashtra State

Sector	Investment (in INR crores)
Port connectivity	13532
Transport- Rail	16895
Transport- Roads, Tunnels and Bridges	21923
Transport- Ports	6200
Transport- Airports	1000
Node Development	60798
Total	120348

Source: Egis

17.4.1 Investment Phasing

As discussed above, all the infrastructure priority projects are categorized as per the proposed development phases and accordingly the investment towards development of these projects are categorized under three major phases as **Short, Medium & Long Term** investments. The following illustration and table explains the Maharashtra share of investment requirement under each of the three phases and also indicates the sector wise share of each of the Phase:

Figure: Share of Short Term, Medium Term and Long Term Investments, Maharashtra

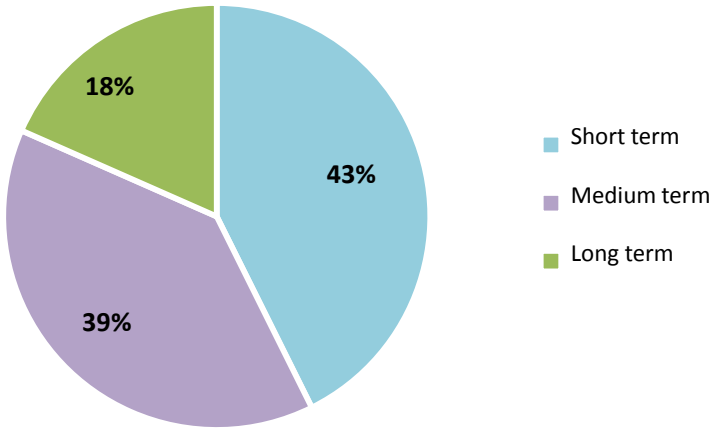


Table: Sector wise total Short, Medium and Long term Investment requirements for Maharashtra

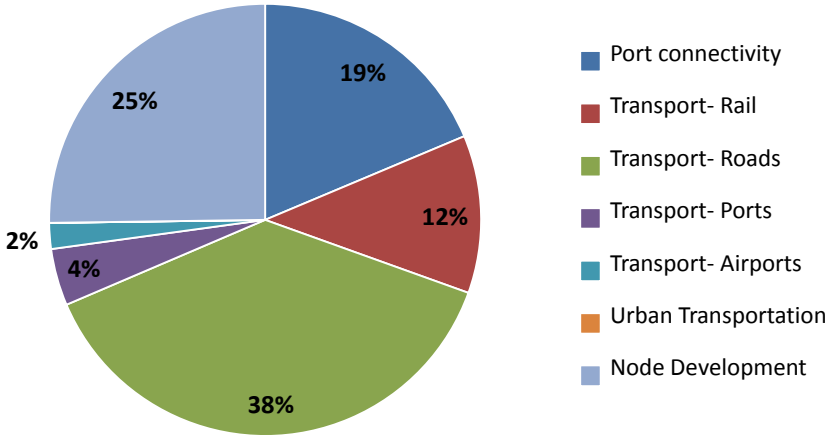
Sector	Investment (in INR crores)		
	Short term	Medium term	Long term
Port connectivity	9631	3901	0
Transport- Rail	6095	10800	0
Transport- Roads	19648	2275	0
Transport- Ports	2200	4000	0
Transport- Airports	1000	0	0
Urban Transportation	0	0	0
Node Development	13010	25728	22061
Total	51584	46704	22061

Source: Egis

Short Term Investment

Total short term investment requirement with five year target period (2017 – 2022), is around **INR 51,584 Crores** (**8.3 Billion USD**), which accounts to be **42.9% of total Maharashtra** State Share of BMEC's Perspective Plan

Figure: Sector Wise Share of Short Term Investments, Maharashtra



Source: Egis

The sector wise break-up of Short Term Investment Requirement is as follows:

- **Major share of short term investment requirement is under Road sector projects** which demands INR 19,648 Crores (3.1 Billion USD) in the initial 5 years of the project period, which accounts to be **38.1%** of the total Short Term Investment Requirement. Proposed Pune Ring Road accounts for about INR 10,400 Crores (1.7 Billion USD), which is 53% of the total short term investment under this Sector in the State of Maharashtra.

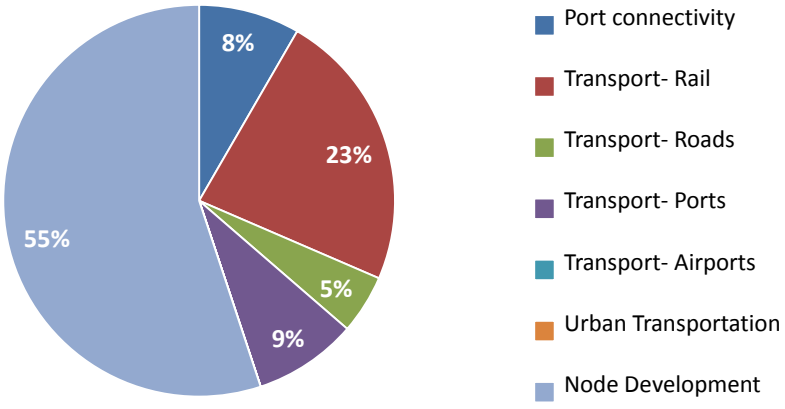
- **Node development** accounts to be the second largest component with share of about **25.2%** in which **INR 5,410 Crores** (**0.9 Billion USD**), **63.7%** of the investment under short term requirements in this sector is attributed to the development of **Satara Node** followed by INR 3,083 Crores (0.5 Billion USD), 36.3%, for the development of Pune Node
- **Port & Port connectivity sectors together** accounts for the third maximum share of **22.9%** of Short Term Investment requirement of BMEC in Maharashtra State. Port Connectivity sector alone accounts for 18.7% of the overall Short Term Investment requirements
- **Rail sector** accounts for about **11.8%** of the total short term investment requirements in which **Baramati-Lonand-Shirwal-Mahad-Dighi line** accounts for major share of about **INR 3,275 crores** (**0.5 Billion USD**) which is **53.7%** of the total short term investment requirements

- **Airport sector** account for **INR 1,000 Crores** (**0.16 Billion USD**) which falls entirely under short term investments is attributed to the development of **New Pune International Airport**

Medium Term Investments

Total Medium term investment requirement with 10 year target period (2022 – 2032), is around **INR 46,704 Crores** (**7.5 Billion USD**), which accounts to be 38.8% of total BMEC's investment requirement for the State of Maharashtra**.**

Figure: Sector Wise Share of Medium Term Investments, Maharashtra



Source: Egis

The sector wise break-up of Medium Term Investment Requirement is as follows:

- **Node development** cost has the maximum share of **55.1%** under Medium Term investment **Pune node** and **Solapur node** accounts for **INR 13,835 Crores** (**2.2 Billion USD**) and **INR 8,204** (**1.3 Billion USD**) which represent a share of 46.8% and 27.8%
- **Rail sector** accounts for **23.1%** of the total medium term investment requirements in which 64.2%, is from **Maharashtra share of proposed Bengaluru-Mumbai Dedicated Freight Corridor (DFC)** which accounts for **INR 6,937 Crores** (**1.1 Billion USD**)
- Port & Port connectivity sectors together accounts for INR 7,901 Crores (1.3 Billion USD) which is about, 16.9% of total Medium Term Investment requirement of BMEC under Maharashtra. Port sector alone accounts to INR 4,000 Crores (0.6 Billion USD), which is 8.5% of the overall Medium Term Investment requirements in the State.
- Roads sector accounts for 4.9% of the total under Medium Term investments in which **Kolhapur-Sangli-Kamalapur (NH204/SH3) upgradation** from 2 lane to 4 lane accounts for about **INR 1,170 Crores** which has the major share of 51.4%

Long Term Investments

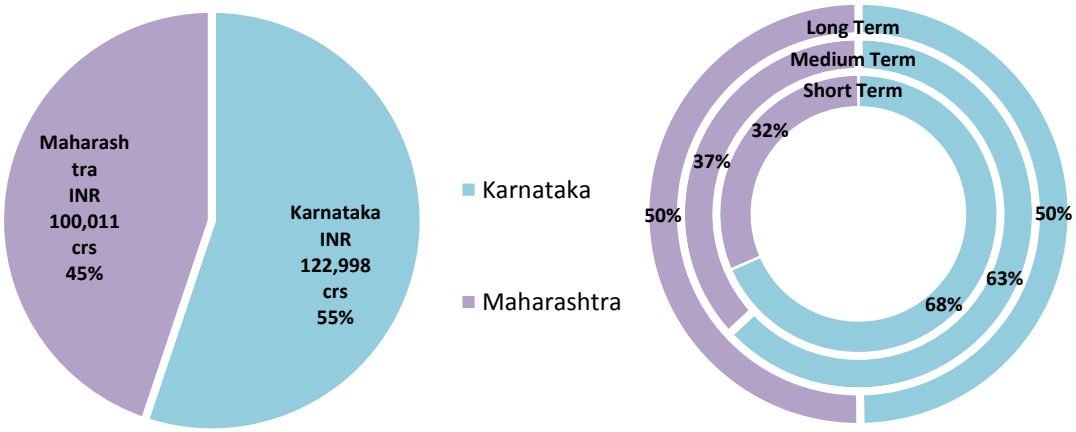
Total Medium term investment requirement with 10 year target period (2022 – 2032), is around **INR 46,704 Crores** (**7.5 Billion USD**), which accounts to be 38.8% of total BMEC's investment requirement for the State of Maharashtra. About **INR 13,732 Crores** (**2.2 Billion USD**) and 60.3% of the total investment under State long term requirement goes to the development of **Pune Node.**

17.5 Energy

Energy sector requires overall investment of about INR 223,009* crores, in which Karnataka requires investments of about INR 122,998 crores which is 55% of the overall requirement under this sector, while Maharashtra accounts for 45% which is about INR 100,011 crores. This cost excludes proposed Gas based power plants and spur gas pipelines to Industrial Nodes which were accounted as part of Node Development cost.

Short Term investment requirement in Energy sector is only around INR 15,829 crores which is only 7.1% of the overall energy sector investments

Figure: Short, Medium and Long Term Investment requirements in Energy Sector



Source: Egis

Proposed renewable energy sources such as solar energy, small hydro power plants, wind energy requires an overall investment of INR 63,759 crores. The total capacity of the power plants proposed addresses 30% of the total power demand in the region. Thermal based power plants require **71.4% of the total investments and are expected to cater to 79% of the power demand**. **Gas based power plants account for 14% of the investments and primarily caters to industrial nodes**

17.6 Housing

17.6.1 Investment Phasing for housing in BMEC Region

Housing sector requires overall investment of about INR 2,229,755 crores (356.8 billion USD) in which Karnataka and Maharashtra account for a share of 52% and 48% respectively. Overall investment requirement in BMEC region in provide in the table below.

Table: Investment requirements for Housing sector in BMEC region (in '000 crores)

States	Nodes/ BMEC region	Short term (in INR '000 crs)	Medium Term (in INR '000 crs)	Long Term (in INR '000 crs)	Total (in INR '000 crs)
Karnataka	Industrial Nodes	21	92	222	335
	Rest of BMEC	200	247	374	821
	Total	221	339	596	1,157
Maharashtra	Industrial Nodes	32	147	378	557
	Rest of BMEC	102	120	294	516
	Total	135	267	671	1,073
BMEC Core		**355**	**606**	**1,268**	**2,229**

Source: Egis

The investments required to address the gap in the supply of EWS/LIG housing has greater significance, as it is assumed that private sector investments in housing sector can potentially meet the demand of other economic groups and also fulfill certain share of EWS/LIG, through mandatory regulations. This gap has to be addressed by development through various Industrial housing & government housing schemes and as part of the node development. **Total estimated preliminary cost to meet the housing demand gap in BMEC region is about INR 202,398 crores (32.4 billion USD), in which the share in EWS and LIG categories is around INR 10,169 crores and INR 192,229 crores respectively.**

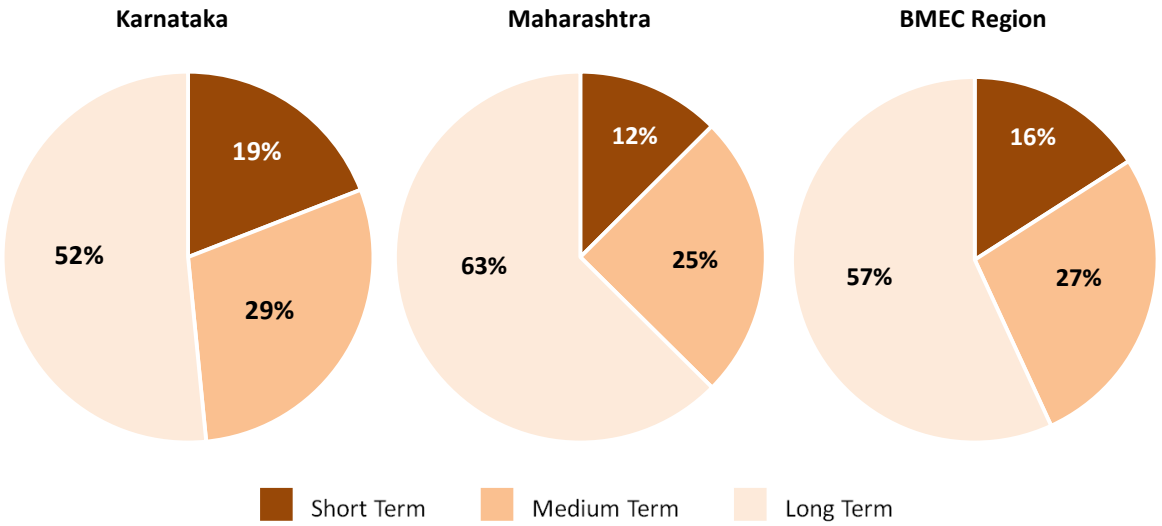
Table: Preliminary construction cost requirements to meet demand gap in EWS/LIG housing (in INR crores)

States	Nodes/ BMEC region	Short term (in INR crs)		Medium Term (in INR crs)		Long Term (in INR crs)		Total (in INR crs)	
		EWS	LIG	EWS	LIG	EWS	LIG	EWS	LIG
Karnataka	Industrial Nodes	94	1,773	421	7,951	1,015	19,178	1,529	28,902
	Rest of BMEC	913	17,256	1,128	21,316	1,706	32,242	3,746	70,814
	Total	1,007	19,029	1,548	29,267	2,720	51,420	5,275	99,717
Maharashtra	Industrial Nodes	146	2,769	672	12,707	1,722	32,554	2,541	48,030
	Rest of BMEC	467	8,828	546	10,312	1,341	25,342	2,353	44,482
	Total	614	11,598	1,218	23,018	3,063	57,896	4,894	92,512
BMEC Core		**1,620**	**30,626**	**2,766**	**52,286**	**5,783**	**109,317**	**10,169**	**192,229**

Source: Egis

Total short term investment requirements in BMEC region to address the housing demand gap is about INR 32,247 crores (5.2 billion USD) in which the share of EWS and LIG accounts for INR 1,620 crores (0.3 billion USD) and INR 30,626 crores (4.9 billion USD) respectively. Medium and long term investment requirements are about INR 55,052 crores (8.8 billion USD) and INR 115,100 crores (18.4 billion USD) respectively.

Figure: Short, Medium and Long Term Investment requirements in EWS/LIG housing Sector to meet demand gap



Source: Egis

17.6.2 Investment phasing for housing in Industrial nodes

Karnataka

Investment required to address this gap in EWS/LIG housing sector is about INR 202,398 crores (32.4 billion USD) for BMEC core region in which the share of proposed Industrial Nodes in Karnataka is around INR 30,431 crores (4.9 billion USD).

- **Short term investment requirements** in proposed priority nodes **is about INR 2,437 crores (0.4 billion USD)** in which **Dharwad, Belagavi and Chitradurga/Davanagere account for INR 1,308 crores, INR 921 crores and INR 209 crores respectively.**
- **Medium term investment** requirements account for INR 11,409 crores (1.8 billion USD) in which the share of priority nodes and other nodes are about INR 5,702 crores and INR 5,707 crores respectively. Belagavi Node has maximum share of about 32.3% of the total medium term investment requirements followed by Ballari Node which is about 29.2%.
- **Long term investment** requirements account for INR 16,585 crores (2.7 billion USD) in which the share of Belagavi and Ballari Node are about INR 4,603 crores and INR 4,068 crores respectively. Belagavi and Ballari Node account for 27.8% and 24.5% of the overall long term investment requirements.

Table: Preliminary construction cost requirements to meet demand gap in EWS/LIG housing for each proposed industrial node of Karnataka (in INR crores)

Nodes	Short term (in INR crs)		Medium Term (in INR crs)		Long Term (in INR crs)		Total (in INR crs)	
	EWS	LIG	EWS	LIG	EWS	LIG	EWS	LIG
Priority Nodes								
Dharwad	66	1,242	44	828	110	2,070	219	4,140
Belagavi	46	874	185	3,498	231	4,372	463	8,744
Chitradurga[+]	10	198	58	1,090	141	2,674	210	3,962
Other Nodes								
Ballari	-	-	167	3,161	204	3,864	372	7,025
Hassan	-	-	99	1,875	99	1,875	198	3,750
Haveri	-	-	20	385	47	897	68	1,282

Source: Egis

Maharashtra

Total estimated preliminary construction cost to meet the housing demand gap in proposed Industrial Nodes in Maharashtra is about INR 50,571 crores (8.1 billion USD) in which the share in EWS and LIG categories is around INR 2,541 crores (0.4 USD billion) and INR 48,030 crores (7.7 billion USD) respectively. About 71% of the investment requirement at the node level in Maharashtra is attributed to Industrial node proposed in Pune District which is around INR 35,962 crores (5.8 billion USD).

- A short term investment requirement in proposed priority nodes is about INR 12,243 crores (2.0 billion USD) in which Pune and Satara account for INR 10,788 crores and INR 1,454 crores respectively.
- Medium term investment requirements account for INR 13,256 crores (2.1 billion USD) in which the share of priority nodes and other nodes are about INR 8,162 crores and INR 5,094 crores respectively. Pune Node has maximum share of about 54.3% of the total medium term investment requirements followed by Solapur Node which is about 27.1%.
- Long term investment requirements account for INR 20,072 crores (3.2 billion USD) in which the share of Pune and Solapur Node are about INR 17,981 crores and INR 3,596 crores respectively. Pune and Solapur Node account for 71.7% and 14.3% of the overall long term investment requirements.

Table: Preliminary construction cost requirements to meet demand gap in EWS/LIG housing for each proposed industrial node of Maharashtra (in INR crores)

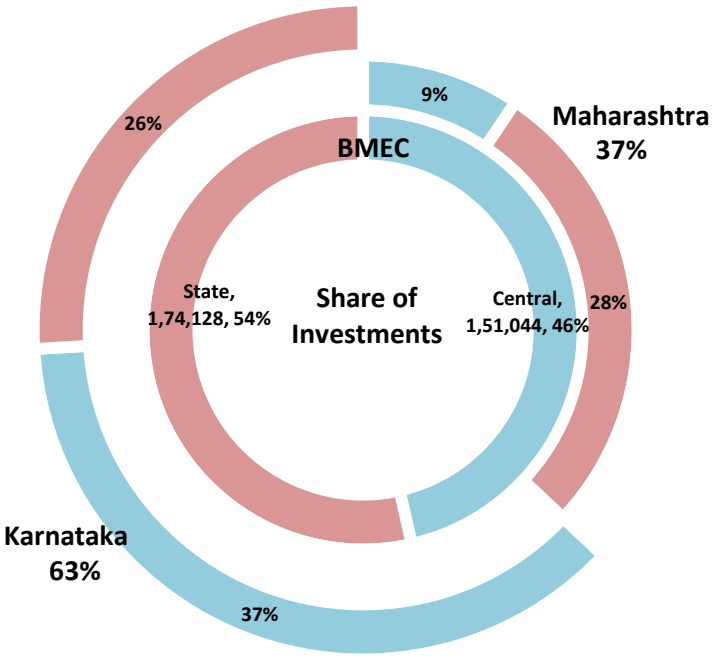
Nodes	Short term (in INR crs)		Medium Term (in INR crs)		Long Term (in INR crs)		Total (in INR crs)	
	EWS	LIG	EWS	LIG	EWS	LIG	EWS	LIG
Priority Nodes								
Pune	542	10,246	361	6,831	903	17,077	1,807	34,155
Satara	73	1,381	49	921	0	0	122	2,302
Other Nodes								
Sangli	-	-	75	1,423	176	3,320	251	4,743
Solapur	-	-	181	3,415	181	3,415	361	6,831

Source: Egis

17.7 Cost Share under Various Institutions

Preliminary assessment of Institution wise or Agency/ Department wise Investment requirement based on BMEC's infrastructure project list and its respective State or Central implementing agencies identified for each project was also carried out. Based on this preliminary assessment, it is estimated that 46% of the overall investment requirements i.e. around INR 151044 crores (54 billion USD) will be the share of investment requirement under various Central Government Departments / Agencies. The share of the same under Karnataka and Maharashtra is about 37% and 9% respectively. The following diagram illustrates the same. Similarly, a preliminary break up of share of investment under each of the Central and State departments/ agencies is also prepared and provided in the report.

Figure: Share of Investment under Central and State Departments



Source: Egis

18. Land Management Strategies

In the context of economic corridor development, land policy is typically not part of the main program, but plays an essential supportive role and one that is fraught with problems. Some of the often-encountered issues include protests and litigation; incomplete land assembly; cost escalation; poor infrastructure where land is cheap and unplanned development around industrial growth centres.

Effective land management policy, therefore, should achieve the following objectives:

- Ensure that suitable land with services is available for the promotion of economic activities
- Establish mechanisms for land assembly that include land owners in such a manner as to avoid social and economic displacement, while providing them the opportunity to participate in the upside of the development.
- Plan for urban development to support the economic development, with due consideration to the region's economy, environment, demography and socio-economic characteristics.

Land is a state subject in India, which means that land management is the prerogative of the State Government. Therefore laws, institutions and mechanisms for land management are mostly at state level. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Bill, 2013, and The Land Acquisition Act, 1894, which it replaced are Central Acts. However each state can make its own version. Most states in India have lEgislation for Town Planning and/or Urban Development. These laws typically evoke the Land Acquisition Act for appropriating land for public purpose. Though most of these town planning laws have a provision for land pooling (a mechanism which obviates the need for completely displacing land owners and instead distributes the load of land appropriation over a larger number of land parcels), only a few states like Gujarat and Maharashtra actively utilize it. The Tamil Nadu Acquisition of Land for Industrial Purposes Act 1997 provides for the government to notify areas for industrial purpose to be acquired. It has special provisions for expediting the acquisition process.

18.1 Existing Legislative and Institutional Framework

18.1.1 Karnataka

The primary vehicle for assembly of land for industrial development in Karnataka is the Karnataka Industrial Areas Development Board, established under the Karnataka Industrial Areas Development Act of 1966. Chapter VII of the Act deals with Acquisition and Disposal of Land. The land acquisition process is similar to that under Land Acquisition Act, but faster, with provisions for negotiated settlement at many stages. Land for large industrial development/ independent industrial development (other than the ones in KIADB Layouts) is also facilitated thorough KIADB. In such projects, cost of acquisition is borne by the investor. The Karnataka Land Reforms Act, 1961, by default protects agricultural land from being purchased by non-agriculturists and/or being used for non-agricultural purposes. Exemptions are available for industrial and some other uses through Clause 109.

18.1.2 Maharashtra

In Maharashtra, the primary vehicle for promoting planned industrial development is the Maharashtra Industrial Development Corporation, established under the Maharashtra Industrial Development Act 1962. Chapter VI of the MIDC Act deals with the Acquisition and Disposal of Land. Though the essential clauses of this chapter are very similar to that in the KIAD Act, the sub-clauses have evolved in much greater detail, probably in response to issues and litigation that have emerged in the course of implementation over a period of time. There are elaborate clauses related to consultations with local bodies and for dealing with compensation related issues.

18.1.3 The new LARR Bill, 2013

Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 and Amendments

In response to sustained criticism of land acquisition as practiced under the Land Acquisition Act, 1894, the Government of India decided to re-examine the existing land acquisition framework. In September 2013 both the houses of Parliament approved the "The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Bill 2013" (LARR 2013 or Bill) repealing the previous Land Acquisition Act of 1894.

Most kinds of developments envisaged in the economic corridors including ports, logistics, warehousing, agro-processing, manufacturing and investment zones, tourism development, housing, etc. are included under the definition of 'public purpose' and will be affected by the LARR 2013. Private sector enthusiasm in structuring project specific SPVs and JV companies for investments may be dampened by the need to procure consent of 75% or more of the affected land owners. The act stipulates that any if there is any purchase (beyond the specified threshold) and resale within 3 years, 40% of the value gain must be shared with original owners. The cost of acquisition of each parcel of land will include Compensation & RR Package due to the owner. (Special provisions are applicable for land owners, livelihood losers & SC/ST). The overall cost may go up by a factor of 2 to 4 from urban to rural.

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Amendment) Bill, 2015 was introduced in Lok Sabha on February 24, 2015 to replace RFCTLARR Ordinance 2015. The Bill allows the government to exempt five categories of projects from Social Impact Assessment, limits on acquisition of irrigated multi-cropped land, through a notification, and consent provisions. The amendments clarify that under Industrial corridors, one of the exempt categories, land acquired for industrial corridors will be for Industrial corridors set up by the government and government undertakings. Further, land can be acquired up to 1 km on both sides of the designated railway line or road of the industrial corridor. According to the Act 2013, 13 Acts were excluded from the RFCTLARR Act but with the Amendment they are now brought under its purview. Thus, it brings the compensation, rehabilitation and resettlement provisions of these 13 laws in consonance with the Act.

The provisions for Social Impact Assessment, consultations, R&R package preparation and procedures mandated may cause a minimum timeline of about 50 months for the acquisition process to be completed. However, based on the proposed Amendment Bill, the Government can

exempt Industrial corridor projects from SIA, limits on irrigated land & consent provisions, through a notification and estimated overall time frame may become 30 months.

18.2 Case Studies of Alternate Land Management Systems adopted for Industrial Development

18.2.1 Special Investment Regions in Gujarat – Dholera

The Special Investment Regions (SIR) that are being created all over Gujarat (connected to the DMIC) take a proactive approach to planning and land management. The SIR Act has a substantial portion of Gujarat's Town Planning and Urban Development Act incorporated within it almost verbatim, enabling the Gujarat Infrastructure Development Board (GIDB) to create entire new cities. The GIDB is empowered to declare new SIRs and create Regional Development Authorities (RDA) for them. These RDAs then prepare Development Plans and Town Planning Schemes for the SIRs. The SIR system is emerging as a parallel system to the urban development department.

The SIR case study shows that advance planning for an industrial region creates the possibility of integrating urban development with industrial development in a harmonious manner. The use of land pooling rather than land acquisition enables the participation of original landowners in the upside of the development process

18.2.2 Magarpatta - Private Sector Land Pooling

Magarpatta was originally multiple plots of land owned by a farmer community called "Magar". The Magar clan and their immediate neighbors comprising 123 families decided that they would develop the land themselves. They pooled 400 acres (162 ha),prepared a private township plan and submitted it to the state government for approval. They rEgistered a company called the Magarpatta Township Development and Construction Company Limited. Present day Magarpatta City consists of a "Cybercity" (an IT SEZ with twelve towers) and supporting residential and commercial development, along with parks and social infrastructure.

The Magarpatta case demonstrates the possibility of democratic, equitable and participatory processes for land management happening on private initiative when the supportive, enabling environment is provided.

18.2.3 CIDCO policy for land management

City and Industrial Development Corporation of Maharashtra Ltd., is a company wholly owned by the Govt. Of Maharashtra and was incorporated in 1970 with the specific aim of planning and implementing Navi Mumbai, a new planned, self-sufficient and sustainable city on the mainland across Thane creek adjoining Mumbai. The total project area was about 34,400 hectares and included 95 villages of Thane and Raigad Districts. The entire private land was to be acquired by the government and placed at the disposal of CIDCO. The 95 goanthans (village settlements) were excluded from acquisition. To equip the local people for employment, training programs were instituted in specially set-up technical training institutes for various technical trades and occupations. The gaothans were provided social amenities like piped water supply, approach roads, drains, septic tanks, upgraded school facilities and medical care.The government then announced the 12.5% Scheme and extended it to all PAPs. In this scheme, the PAP is given back developed land,

which is 12.5% of the land acquired from him. Out of the 12.5% entitlement, 30% is reserved for social facilities and public utilities. Thus net allotment would be 8.75% of the land acquired from him. The plot allotted to the individual has 1.5 FSI and 15% commercial component permissible on the plot.

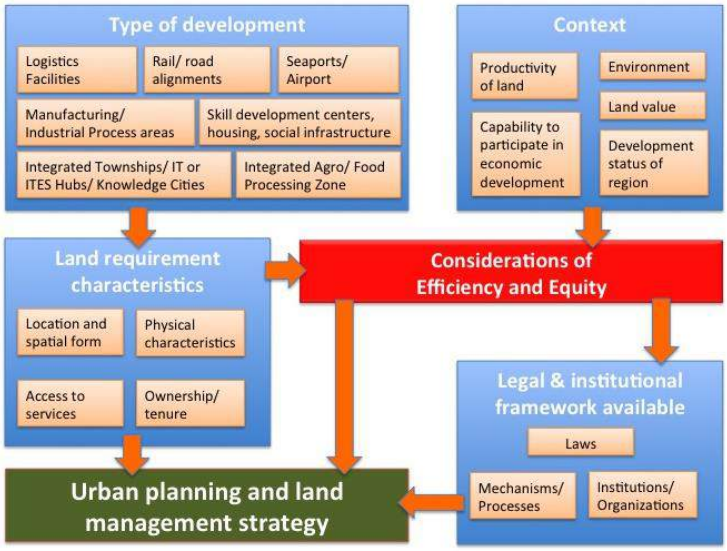
The approaches adopted by CIDCO to rehabilitate the landowners economically and to include them in the overall development process by allotting developed land to them have both been considered as pioneering in those days. These approaches are very much relevant event now.

18.3 Land Management Strategies for BMEC region

The proposed land management framework for the Bengaluru Mumbai Economic Corridor consists primarily of two sets of elements. The first of elements relate to land management – LEgislation, Institutions and Mechanisms/ processes. The second set of elements relate to the land requirement – Location and spatial form, Physical characteristics, Access to services and Ownership/ tenure. These two sets of elements operate in a larger context, which is often decisive in its own way. The context includes geographical, social, economic and political dimensions.

18.3.1 Structuring a land management framework

The following aspects are import for strategy formulation: The type of development determines the characteristics of land requirements, which in turn, raises considerations of efficiency and equity. The context directly influences considerations of efficiency and equity. The legal and institutional framework available in the state determines the ability of the government and promoters to address concerns of efficiency and equity. The decision making process is depicted in a diagrammatic form below:



18.3.2 Urban planning and land management mechanisms

It is amply clear that the practice of land acquisition is going to become increasingly difficult, time consuming and expensive. Meanwhile, the case studies show that while land acquisition and land banking have distinct advantages in terms of efficiency, these are by no means the only methods of land consolidation. The practice of land pooling in Gujarat (Town Planning Schemes) demonstrates a

fair, equitable, economical as well as efficient method to consolidate land without any displacement. The case of Magarpatta demonstrates that the same process can happen even in the private domain with limited or no government involvement. The CIDCO model of giving land in lieu of land as part of the compensation package also holds promise in mitigating the impacts of land acquisition.It is recommended that the planning and land management strategy for the BMEC should use a combination of these mechanisms, based on the regional context. The report gives antabulated overview of how the choice of land management mechanism can be correlated to the context where it is required and related issues to be addressed.

19. Need for District/ Sub Regional Planning

Bengaluru Mumbai Economic Corridor Perspective Plan (BMECPP), is a Regional Level Perspective Plan which has formulated a Vision and strategized the economic development of the corridor region through identification of potential industrial sectors, appropriate locations for development of Industrial Node cum Mega cities, along with major Infrastructure components which needs to be developed to promote induced Industrial development of the region and to attract investments. This perspective plan has also identified priority infrastructure projects under various sectors and its phased development.

Although, implementation of BMECPP components, in part, can be initiated with the preparation of Master Plans identified Priority Industrial Nodes cum Mega cities and preparation of Feasibility Studies cum DPRs for Early Bird Infrastructure projects, in order to have an "whole to part" approach, prior to preparation of Master Plans & DPRs, there is need to supplement the Regional Level Perspective Plan with **District Level / Sub-Regional Development Plans.** This intermediate stage of planning will streamline & translate the Vision & strategies of the Perspective Plan to a Development Plan for each of the districts within the BMEC region. Projects proposed in BMECPP are to be carried out by identified nodal agencies in collaboration with ULBs whose priorities are to be met at the district and local level. This Plan would also ensure participatory approach of various stakeholders' including institutions such as District Planning Committee and ULBs for effective implementation of BMEC Perspective Plan and would act as a tool to achieve comprehensive development and inclusive planning in the corridor region.

This District Level/ Sub-Regional Development Plans shall be prepared for all the districts under BMEC Core region and also for some of the coastal districts which would be influenced by development of Port Infrastructure.

19.1 Objective & Broad Scope of District/Sub-regional Development Plan:

Prime objective of this Intermediate planning process is to;

- **To develop district level Industrial Development Plan, which would supplement BMECPP towards implementing sustainable industrial development which would promote economic development of the region**
- **To facilitate project structuring & implementation of BMECPP's regional level vision & strategies at every BMEC core district**

- **To provide specific sector wise directives & targets to respective Stakeholders for every BMEC core district**

The following are some of the key components of District/Sub-regional Development Plan:

- **Urban Rural Continuum** to be managed efficiently by creating polycentric urban regions to accommodate the development scenario outlined in BMEC PP
  - Assessment of spatial growth & requirement for expansion of jurisdiction in key urban regions to be carried out with specific focus on development Brownfield Mega Cities/ Smart cities
  - Outline to be drafted for the Master Plan preparation of key urban regions which will enable ULBs/DAs to expedite the process within the framework of Maharashtra Regional and Town Planning Act, 1966 and Karnataka Town and Country Planning Act, 1961.
    - Preparation of Road map to augment physical infrastructure such as Public & Semi-public, green/open spaces, utilities, etc.
    - Identify/develop environmental infrastructure facilities such STPs, SWM sites, HWM sites
    - Plans to strengthen social amenities (Health & education) at each of the identified urban centres
- **Industrial Action plan** to promote Industrial Development as envisioned in BMECPP for next 25 years:
  - Plan and facilitate resource mobilisation (land & other resources) towards development of Phase II industrial Nodes. Phase II would include, development of priority nodes (if required), identifying sites for nodes other than the priority nodes identified as Phase I development
  - Phased planning of Large scale Industrial development in the region, Brownfield Industrial Area Development, Development of Conventional model industrial Development (as promoted by KIADB & MIDC) and Industrial Clusters, to achieve the share of industrial development envisioned for each districtas per BMEC (Excluding Development of Greenfield Nodes cum Mega Cities)
  - Enhancement of supply chain mechanism for key industrial sectors envisioned for eachof the district through cluster development initiatives
  - SSI, MSME and cottage industrial sector development perspectives
  - Development of technical / vocational education Institution to provide local skill man power to fulfil the estimated employmentdemand under each sector for each district
- **Sustainable development** practices to be adopted to ensure efficient resource utilization and eco-friendly development.
  - Delineation of ecologically sensitive areas in the region and develop framework for developmental activities based on specific conservation requirements
  - Identify/develop eco-tourism opportunities in the region including heritage/cultural sites, regional parks and other recreational zones
  - Sustainable / multi modal public transport systems within and connecting key urban regions
  - Improve accessibility within the region integrating rural centers to the regional network
  - Identify gaps in provision of rural amenities specific to Health and Education sector within the district and prepare phase wise plan to provide adequate facilities

- Establish markets for agricultural produce in the region
- Identify/establish region specific agricultural practices such as micro irrigation, water harvesting, organic farming, crop waste recycling, etc.,

- **Infrastructure Implementation Plan,** to implement enhance district level infrastructure to facilitate industrial development and attract investments. This will comprise of planning of resource mobilisation and coordination at each district level towards implementing the both Regional Level infrastructure & District level/ node level infrastructure projects identified under various sectors of BMEC. This planning process will also identify various district level infrastructure projects which will supplement the major infrastructure project and would strengthen the overall development of the district.

- **Comprehensive Land Use Zoning Plan** to identify & delineate areas for Industrial and Urban Development and to protect and conserve environmentally sensitive areas including natural water bodies & drainage systems, areas under double crop/ irrigated areas and heritage sites. This will also integrate & incorporate other district level plans which are in place.

As mentioned above, these are broad components of the plan and a detailed scope can be prepared in joint discussion with all the stakeholders of BMECPP. The plan preparation can either be carried out by the SPV formed for implementing the BMECPP or by the nodal agencies of respective State Governments under the guidance of DIPP.

20. Marketing Strategy

The marketing strategy aims to enhance BMEC's competitiveness and promote the economic growth of the region. Marketing is crucial for development of BMEC region serving several purposes including attracting potential investors for development of node infrastructure, providing information to community to support development and potential businesses in the region. Marketing strategy should essentially focus on promoting the corridor vision, the major unique selling proposition (USPs) of BMEC, attracting investors to this corridor and identifying developmental agencies for implementation of marketing strategies.

As discussed earlier, from a marketing standpoint, it is essential to highlight the green vision of the corridor, the strength of nodes/districts in BMEC comprising of market and resources. It is also important to highlight the elements related to quality of life including environment (clean air, water, and green spaces), recreational opportunities, and cultural amenities. Investors will be open to move to areas which have quality resources, including labor and materials, and good market connectivity. Therefore, it is pertinent to development trunk infrastructure in BMEC area. Major ideas which will be highlighted in the marketing campaign include:

Vision

Promote BMEC Region as a Globally Competitive and Sustainable Region

Major USPs of BMEC corridor include:

Before starting with the overall marketing initiative for the corridor, it is essential to highlight the objectives and strategies for marketing development.

Objective 1: Develop communications plan with clear series of messages highlighting BMEC as a plan to grow and invest

Strategy 1: Develop marketing communications plan
As mentioned above with green vision and technological prowess, BMEC is expected to be a powerhouse for economic development in southern and western part of the country. Highlighting the clear message of investment with major USPs of the region will form an important step towards attracting investors to the region. The communications plan will include messages which will highlight BMEC as a place to invest through print, online, visual and event/tradeshows channels.

Objective 2: Highlight interactive tools for investment attraction

Strategy 1: Develop an online presence
A dedicated website may be developed for the BMEC Project containing all the information relevant to the Project. It should be conceptualized and designed to present useful information about the Project in an appealing way. The website will include all details of the corridor including the corridor vision, major USPs of the project, priority nodes to be developed, description of the projects etc. Online presence will be further strengthened through Facebook, LinkedIn, Twitter, YouTube, audio-visual clips, outreach articles and other initiatives.

Strategy 2: Create and distribute marketing collaterals
Different marketing collaterals in form of one pager, brochure, an audio-visual (AV) clip and presentations may be prepared. These collaterals will be prepared in general at the overall corridor level and also at specific node level. These collaterals aimed for strategic and industrial investors in the BMEC region will aim to highlight the corridor advantages, details of major projects and what is in it for investors to invest in the corridor region. These collaterals will have to be distributed by marketing agencies for BMEC in association with industry associations.

Objective 3: Develop marketing campaign

Strategy 1: Appoint campaign manager for BMEC

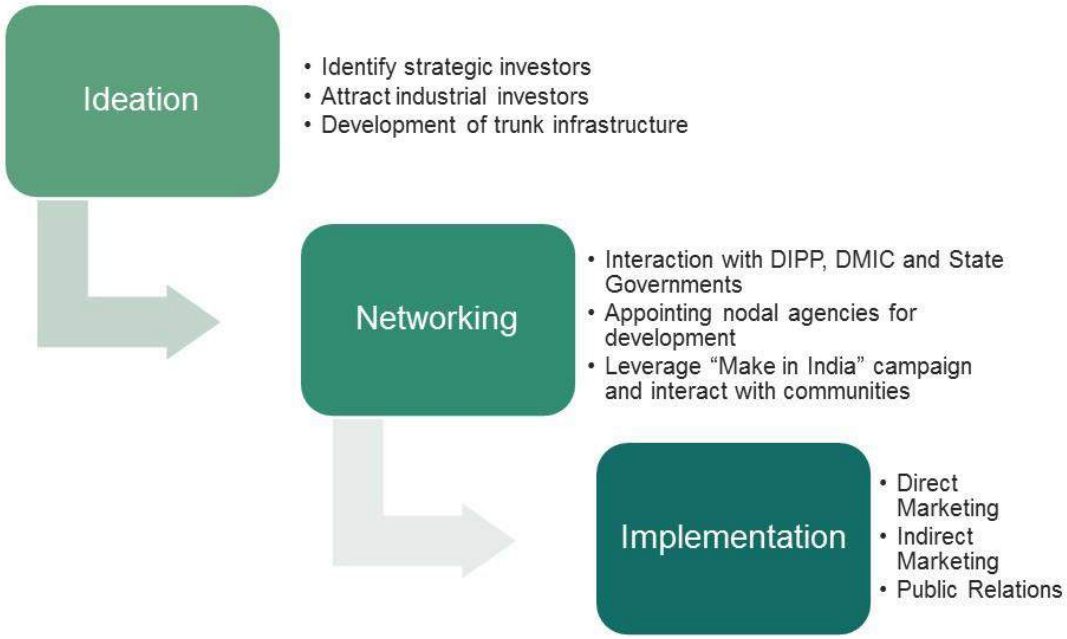
Marketing agencies appointed by BMEC at central and state level need to appoint campaign manager responsible for developing B2B and B2C marketing campaign strategies for nodes. Campaign manager will be responsible for implementation and tracking of marketing campaigns and there effectiveness. Campaign manager will also be responsible for writing promotional materials at the corridor and node level in association with state level nodal agencies and marketing agencies at nodes.

Strategy 2: Appoint advertising agencies for implementation

Marketing agencies appointed by BMEC at central and state level need to appoint advertising agencies responsible for print and visual advertising. Campaign manager will work in coordination with such agencies to develop, plan, production and print creatives for campaigns. Advertising agencies will be responsible for producing television commercials, out of home advertisement, radio commercials, mobile marketing etc.

20.1 Marketing Process

The entire marketing process will be divided into the following stages with initial focus on developing the marketing message for the corridor, identifying strategic investors, appointing agencies for node development and creation of marketing material for promotion. These steps have been detailed out in the subsequent sections for reference.



Overall, these marketing phases can be divided into time frames of short, medium and long term. Short-term focus will be on the ideation phase where strategies to identify and attract investors in BMEC region needs to be initiated. Medium term focus will initiate once the investors for node development have been identified. Marketing of priority nodes of BMEC needs to be initiated in the medium term itself. Long term focus will be on overall marketing of phase 2 nodes and development on remaining districts in the BMEC region.

20.2 Phases in marketing strategy

20.2.1 Ideation phase

The main USPs of BMEC as mentioned above need to be marketed in a streamlined manner to attract investor attention and create enabling environment for strategic investors. This phase will involve interaction and coordination among both state governments and central government to dovetail strategies for attracting investors. Target market for BMEC infrastructure development will include strategic investors who will responsible for node development and facilitation of industrial activities in the region including government of UK, JICA, India's major trading partners and other multi-lateral agencies etc. Target market for industrial unit development will include large/medium/small industrial houses in the country who will be responsible for establishment of industries in the corridor region. Large scale real estate groups may come in for developing townships and industrial cluster units as master developers. Major deliberations need to be done between the central government and state government on the following aspects:

Identifying strategic investors for the BMEC region

- Major task will include identifying strategic investors who will be interested in developing priority infrastructure in the BMEC region. United Kingdom government which has already evinced interest in development of the corridor may be approached. Other agencies such as JICA which is currently providing assistance in development of other corridors in the country including DMIC and CBCIC may be approached. The World Bank and ADB are involved into planning of Amritsar Kolkata corridor and Vizag-Chennai corridor respectively.
- It is also important to analyze the countries which are major trading partners for India who may be leveraged for attracting investments in the BMEC region. As per Ministry of Commerce data, top five trading partners for India include China, United States of America (USA), United Arab Emirates (UAE), Saudi Arabia and Germany with these countries accounting for ~35% of the total trade with the country. USA and UAE are the major destinations for Indian exports.
- Identified nodes in the BMEC region may be marketed to investors as per their USPs i.e. technology intensive, investment intensive and employment intensive nature.

Technology Intensive: Pune, Belgaum, Dharwad, Chitradurga, Davanagere

Pune
- Global engineering and auto companies
- Established supply chain

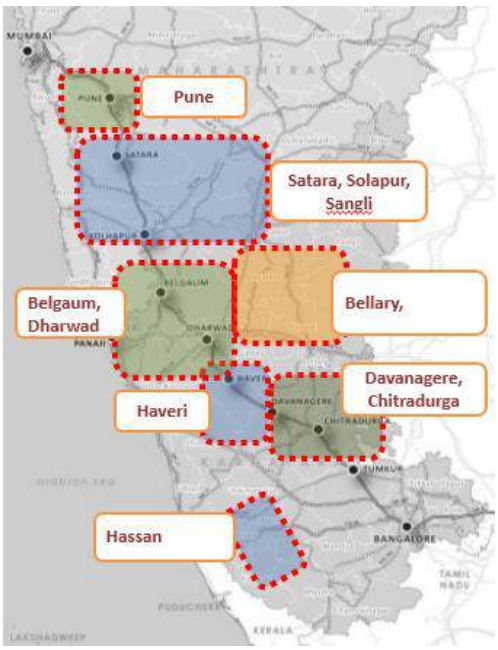
Belgaum, Dharwad
- Proposed aerospace parks at Hubli and Belgaum
- Collocating auto-component manufacturing and design centres

Davanagere and Chitradurga
- Establishment of aerospace research & innovation centre co-located with IISC Chitradurga
- Proposed aerospace &aeronautical university and flying training at Davanagere

Investment Intensive: Bellary
- Natural resource availability
- Proposed steel zones

Employment Intensive: Satara, Sangli, Solapur, Haveri, Hassan,
- Established engineering and textile base
- Thriving agro base

Technology Intensive
Employment Intensive
Investment Intensive



- **Development of each type of node may be proposed to a separate investor i.e. one investor (single/group countries/agencies)** may undertake development of technology intensive nodes including Pune, Dharwad, Belgaum, Chitradurga-Davanagere while other investors may be proposed to develop investment intensive node of Bellary. Development of similar nodes as per their characteristics are expected to provide synergy benefits for the investors.
- **Another mode of development of node infrastructure may involve development through foreign and Indian investors**. It may be proposed that foreign investors may undertake development of phase 1 priority nodes of Dharwad, Belgaum, Chitradurga-Davanagere, Pune and Satara while phase 2 node development may be initiated by Indian investors.

Devising responsibility matrix for investors in BMEC

- Initially, in the short term, it is pertinent to allocate developmental responsibilities across different developmental areas in the corridor. Major development areas in the corridor need to be bifurcated into the following major heads:
  - **Development of trunk infrastructure**: Major components for development may include construction of national/state highways, rail lines, power plants, trunk water supply lines etc
  - **Development of node infrastructure**: Components under this may include development of CETP, solid waste management plants, water supply plants, social infrastructure including housing and recreational facilities etc
  - **Industrial units development**: Construction of industrial units as per investor requirements

How to attract industrial investors in BMEC region

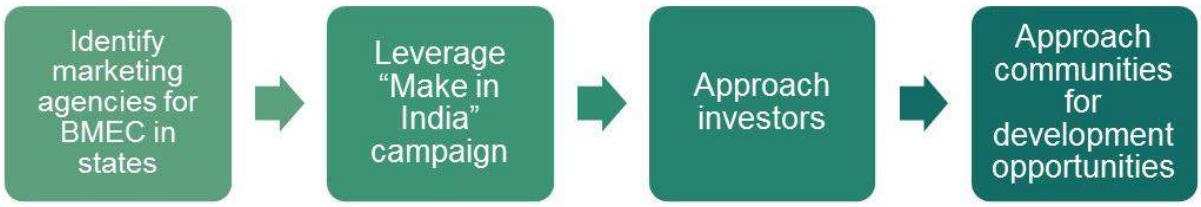
- This will involve creating enabling environment for industrial investors through development of sops/incentives to attract investments in the region
- This will also involve creating sector specific strategies to focus on existing as well as emerging sectors in the region which are expected to play a pivotal role in development
- Existing industrial policies of Karnataka and Maharashtra may be dovetailed to include special provisions for industries in the BMEC region

Development of trunk and node infrastructure

- Deliberations need to be undertaken between the state and central government on development of trunk, support and node infrastructure in priority nodes of Karnataka and Maharashtra
- Post development of priority nodes in both states, responsibility for development of remaining nodes needs to be finalized between the respective states and central government so that a clear cut action play on development of infrastructure can be showcased to investors

20.2.2 Networking stage

Major tasks undertaken in this stage will include respective state governments devising strategies for attracting investments and marketing the respective priority nodes identified. The stage will also include leveraging “Make in India” campaign and approaching strategic investors and communities. This task needs to be undertaken through the following activities:



Identifying marketing agencies for BMEC

- Appointment of a separate marketing agencyat central level which will be responsible for marketing of BMEC and coordination among state level agencies may be undertaken by DIPP/DMICDC. The proposed corridor development authority may also be entrusted with this responsibility.
- Identification of marketing agency for BMEC at the respective state government level would also be needed. Such agency will work in hand to hand with the state level nodal agency appointed for developing BMEC. Karnataka Udyog Mitra for instance can take up task of marketing BMEC nodes and infrastructure in Karnataka. Similar agency in Maharashtra may also be appointed.
- Each node in BMEC region will have inherent strengths which will play an important role in node differentiation. Therefore, each node will have to be independently handled by a separate agency which will be responsible for entire development of the node. Also, as highlighted in the market assessment, each node in BMEC has a unique blend of strengths which need to be leveraged to attract strategic investors for the node.
- Marketing agency in each node will hold the final responsibility for node development including approaching strategic investors, developing marketing promotional materials etc. State level marketing agency will hold responsibility for conducting road shows for overall BMEC promotion in respective states.
- Concept notes on early-bird projects will have to be developed by marketing agencies in association with state governments

Leverage "Make in India" campaign

"Make in India" campaign launched by the Central Government inorder to transform India into a global manufacturing hub needs to be integrated in node-wise strategy for attracting investments. Potential industrial sectors in each node has been identified which leverage existing industrial as well as social infrastructure in the region. Make in India already highlights development plans for 25 identified sectors. Development plans for industrial sectors having concurrence with Make in India campaign may be further developed as per nodes. Moreover, "Make in India" website may also showcase BMEC nodes having designated sectors as per the campaign.

Approach investors

As already discussed in the ideation stage, strategic investors which will be involved in development of nodes will need to be identified. Once, these investors are identified, in networking stage they will be approached by state level marketing agencies in coordination with state government and DIPP for facilitating infrastructure investments in the nodes.

One of the major highlights of BMEC being a green industrial corridor needs to be promoted with strategic investors. The corridor is expected to generate incremental jobs of 23 billion with expected investments of approximately USD115,000 million. The corridor while leveraging upon existing sectors of textiles, agro/food processing and heavy engineering will also focus on development of emerging sectors which include aerospace, defence, nutraceuticals, technical textiles etc.

Value proposition for strategic investors

For strategic investors, investment in development of node infrastructure, will provide opportunity to be a part of one of world's fastest growing economy. India has a thriving economic base with fastest-growing middle class. Central government is also focusing on "Make in India" campaign to attract investors for development into the country. Government is focusing towards improving the doing business environment which will play a critical role towards attracting investments. Large scale real estate developers may work with state governments for development of townships and industrial parks as master developers.

BMEC's unique proposition involves promotion of green vision in the corridor area. Focus will be on use of renewable energy and reduction of emissions. Karnataka and Maharashtra are among the few states having wind and solar energy potential in the country. Wind energy can be further harnessed in several districts of Karnataka including Chitradurga, Davanagere, Belagavi, Gadag, and Koppal where windmills are currently installed. Satara and Sangli districts in Maharashtra also are leading districts for wind power projects with several wind power projects installed in the vicinity. Sectors such as biotechnology, nanotechnology, renewable energy, 3D printing, robotics, biometrics and education sectors are expected to play an important role in BMEC region development going forward. Moreover, with Dabhol gas pipeline passing through the region, units in the region are expected to be benefitted from clean fuel.

Investors developing priority nodes in the corridor including development of Dharwad, Pune and Belgaum nodes will have access to the existing industrial base in these districts which can be further harnessed for development. Pune district already has an established auto and IT base while districts of Dharwad and Belgaum have an established engineering base which can be further leveraged by the investors. Moreover, with both Karnataka and Maharashtra governments focusing on the corridor, investors are expected to receive developmental support.

The following table indicates the indicative list of foreign and India investors who may be targeted to initiate development in the BMEC region as per the major sectors. These established players may initiate development in the priority nodes of the BMEC region through establishment of industrial units and support units which will play a critical role in attracting investments going forward

Sector	Foreign investors	Indian investors
Food processing	Kraft, Nestle, Del Monte, Kelloggs, Unilever, Coca Cola, Pepsi	Dabur, Parle, Gujarat Cooperative Milk Marketing Federation, MTR
Textiles	Benetton, Zara, Mango, Esprit, Marks & Spencer	Welspun India, Raymond, Arvind Mills, Reliance Industries, Vardhman Group
Automobiles	Ford, Toyota, Volkswagen, Suzuki, General Motors, Renault, Nissan	Maruti, Tata Motors, Mahindra, Ashok Leyland, Eicher Motors
Automobile Components	Bosch, Delphi, Denso, Valeo, ZF, Magna	Bharat Forge, Tata Cummins, Amtek Auto, Shriram Pistons & Rings
Electronics	Samsung, LG, Dell, GE, Lenovo, Applied Materials, Flextronics	Bharat Electronics, Videocon Industries, Moserbaer, TVS Electronics

IT/ITES	Accenture, Cognizant, IBM, Capgemini, Microsoft, Qualcomm	Tata Consultancy Services, Infosys, Wipro, HCL
Biotechnology	Sanofi Aventis, Abbot Laboratories, Hospira, Endo Pharmaceuticals	Biocon, Serum Institute of India, Reliance Life Sciences, Bharat Serums and Vaccines

Source: MakeinIndia and IBEF

Value proposition for industrial investors

BMEC will connect two urban and economic development centres – Mumbai and Bengaluru. It will develop as a contiguous economic region encompassing few growth centres of industrial-urban development. Presently, the region presents itself as a good contributor to the economy of India. The region houses a few important urban centres such as Bengaluru, Mumbai, Pune, Kolhapur, Hubballi-Dharwad, etc. It covers 7% population of the India and 9% of main workers in the country. The region contributes 14% to secondary and tertiary sector GDP of India and 15% to India's secondary sector share.

Both Karnataka and Maharashtra already have the educational infrastructure for skill development which can be leveraged by industrial investors. Moreover, investor initiatives programmes of "Advantage Karnataka", "Doing Business in Maharashtra" "Make in Maharashtra" are playing an important role in attracting investments. Therefore, industrial investors are expected to be benefitted from investment policies in the two states and clean fuel availability in the region.

Approach communities for development opportunities

It is essential to involve communities in developmental opportunities in the corridor region. Highlighting development of small scale industries with cluster approach and expected thrust on skill development initiatives should be highlighted to communities. Attracting communities towards corridor development will give investors publicity and marketing benefits.

20.2.3 Implementation Phase

Major tasks undertaken in this phase include the developing the marketing communication plan, identifying tools for marketing and developing promotional materials for investors. Campaign manager identified for BMEC region will be responsible for developing content for direct and indirect marketing in association with node level marketing agencies.

Objective 1: Generate adequate interest about the corridor among strategic investors and industrial houses

To achieve the objective, various promotional activities to publicize the basic concept envisaged in the corridor and create its market positioning will have to be undertaken. As discussed earlier, clear marketing communication plan needs to be developed before identifying the different tools of direct and indirect marketing for development.

Major components of marketing communication plan

Objective 2: Identify marketing tools for interaction

Marketing campaign will be a mix of direct and indirect marketing methods that will include the following marketing media:

1. Direct marketing
    a. Interacting with trade associations: FICCI, CII, ASSOCHAM etc
    b. Participation in international events
    c. Road shows
    d. One-to-one business meetings and presentations
2. Indirect marketing
    a. Print and internet media
    b. Outreach Articles
    c. Dedicated website for BMEC and separate section on BMEC at DIPP, make in India website

Campaign manager identified for BMEC region will be responsible for developing content for direct and indirect marketing in association with node level marketing agencies.

Initially, priority nodes need to be marketed which include Dharwad, Belgaum, Chitradurga-Davanagere, Pune and Satara. During the first phase of BMEC development, these nodes need to be the main focus. Once trunk infrastructure has been developed in these nodes, industrial infrastructure needs to be marketed. Post development of nodes in BMEC phase 1, phase 2 node marketing needs to be initiated with the investors.

Direct Marketing

As our target market consists both mix of investment agencies and large/medium/small industrial establishments, using public media to publicize about the corridor project may not yield the desired results. Marketing efforts will have to be pro-active, engaging, focused, timely and efficient. Therefore, extensive use of direct marketing methods including interaction with industry associations, participation in international events, road shows and one-to-one presentations will need to be undertaken.

Core Marketing Committee under each node marketing agency will need to be formulated which will work in close coordination with state level marketing agency and DIPP. The Committee should comprise important government officials in the district and state level officials along with DIPP who will pitch for the project to the investors and will also make sure that suitable changes are made in government policies to make the project attractive for investors.

Strategies for direct marketing include:

Strategy 1: Interactions with trade associations: FICCI, CII, ASSOCHAM

Trade associations such as FICCI, CII and ASSOCHAM have sector specific knowledge events and sectoral sub-committees which comprise of representatives from industrial houses. These associations also undertake knowledge sharing activities through production of knowledge papers and thought leadership reports which may play an important role for promotion of corridor projects. Also, knowledge events may provide networking opportunities for BMEC marketing agencies and investors.

Strategy 2: Participation in international events

International expositions and trade fairs serve as an important platform for networking and interacting with investors and focusing on "Make In India" campaign in the BMEC region. Comprehensive research will have to be undertaken to identify international trade fairs with participation from campaign manager and marketing agency appointed.

Strategy 3: Road shows

Road shows in key locations in India will need to be undertaken. Road shows may be undertaken in Bengaluru and Mumbai along with New Delhi. Road shows in Bengaluru and Mumbai will play an important role in creating thorough understanding of the corridor project. The road show locations will have to be identified on the basis of concentration of target audience.

Strategy 4: One-to-one business meetings and presentations

Based on the leads generated from the road shows, one-on-one meetings may be organized with target investors/ industrial houses. It is essential that representatives from Core Marketing Committee and state-level marketing agency participate in these meetings.

The meetings will cover the following discussion points:

- Why invest in BMEC
- Salient features of BMEC corridor
- Feasibility assessment
- Project structure
- Government support and incentives
- Key concerns to be addressed
- Queries if any

Indirect Marketing

Strategy 1: Advertising

Advertisements will be used to create awareness about the BMEC Project. These will also be used to direct interested parties to gather detailed information on the Project through the dedicated website of the Project /DIPP and Make in India website.

Three types of media may be used to advertise about the Project:

- Print media
- Internet media
- Events media

The content and design of all the advertisements on the BMEC project will be in sync with the overall marketing concept and branding identity. The advertisements will be designed to position the Project as an iconic development in the region and will contain basic information about the Project. These advertisements will call on interested parties to contact designated marketing agency officials and refer to the dedicated website for further details on the Project.

Print Media	Internet advertisements	Events Advertisements
Advertisements may be placed in leading national and international business and trade magazines to reach out to the investor community in national and international markets.	Internet advertisements will be placed on the websites of the events it is planned to participate. Also internet advertising on social networking websites such as Twitter, LinkedIn and YouTube may be used where "Make in India" campaign is successfully being marketed.	Event advertisements will be used for the events where it is planned to participate as per research and suitable deliberations.

Strategy 2: Outreach Articles

Outreach article may be prepared on the BMEC project. The article may be placed in international and national business magazines and newspapers as well as in publications of industry associations such as FICCI, CII etc to ensure maximum outreach to the target market. The article may cover the following aspects of the Project:

- BMEC corridor - vision and objectives
- Project features
- Feasibility
- Project structure
- Government support and incentives
- Risk mitigation
- Who should invest
- Contact information

Strategy 3: Dedicated website for BMEC project

Dedicated website may be developed for the BMEC Project containing all the information relevant to the Project. The dedicated website for the Project will be a natural extension of the marketing plan and branding identity. It should be conceptualized and designed to present useful information about the Project in an appealing way. Marketing agencies identified at the state level along with central level agency need to finalize material in association with campaign manager for the website. Concept notes prepared for early-bird projects for phase 1 nodes need to be put on the website. Separate agency may be appointed for development and maintenance of the website. Social media linkages will have to be created to bring traffic to the website. Campaigns on LinkedIn, Facebook, Twitter will play an important role in diverting traffic to the website.

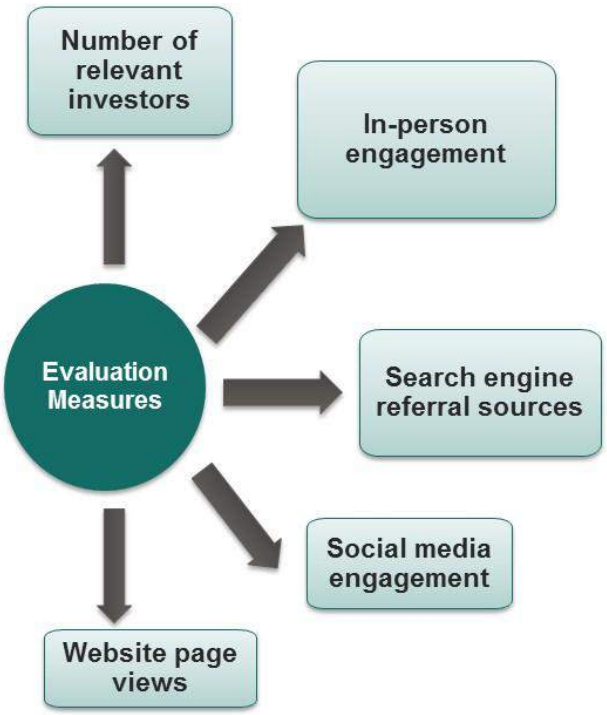
Public Relations

Public relations for the project are expected to build a positive image for the project. Some promotional material that can be used as part of the public relations campaign include:

- **Press/News Releases** – share information with media regarding events, economic developments, new infrastructure projects or business investments in the BMEC region
- **Events** – launch events and ribbon cutting ceremonies for early-bird projects/ priority nodes
- **E-Newsletter** – direct communication to agencies/investors about various activities in BMEC region

Design and implement evaluation mechanisms

Marketing campaign launched for BMEC will have to be evaluated to measure its performance and make necessary changes in strategy incase of non-performance. Marketing campaign needs to be evaluated on a monthly basis initially to understand the investor interest in the project.



The number of relevant industrial investors who contact the marketing team will be an important parameter to measure the effectiveness of the marketing campaign. Moreover, feedback through direct marketing events will be an important indicator for measuring the effectiveness of marketing promotion materials. Search engine referral sources can be tracked using analytics tools to understand the key words used by people to come to the corridor website. Page views for website will also provide important indicator of the marketing campaign's engagement levels. Several tools for social media engagement can be used for understanding leads followed through these sources.

21. Way Forward

This Final Perspective Plan Report primarily focused on **identification of appropriate locations for Node development, facilitating the Government in the process of identifying priority nodes for developments, identifying appropriate site locations of the identified priority node locations, estimating the infrastructure requirements of the nodes, identifying priority infrastructure projects which are expected to promote node development, phasing of node development and investment requirement for development of nodes.**

Further, it covered **implementation phasing and investment requirements of all major projects under each of the infrastructure heads, across the region structured as per the phasing of node development** and the same was presented as a **comprehensive list of project under each of the States under three main implementation phases of Short, Medium & Long term**.The above-mentioned listing has also identified the node wise Early Bird projects & other priority project. This report also emphasises the need to carry out the next level of planning, which are the"Sub-Regional Plans" for the BMEC districts, which would structure and ensure the implementation of BMEC components other than that of the Nodes. Apart from the above-mentioned the report has updated all the components discussed in the draft version of the Perspective Plan based on inputs provided by various stakeholders and through continuous interaction with them.

As mentioned earlier, this final report was prepared as per the three priority nodes (Dharwad, Belagavi & Chitradurga- Davangere) finalised by Government of Karnataka for Karnataka Region of BMEC and the one priority node (Satara Node) as intimated by Government of Maharashtra to explore as the priority node for Maharashtra region of BMEC, during its meeting on 29th July 2015 and also as per the report on recommendation on finalisation of node locations, submitted by the consulatnst on 1st September 2015.

However, the priority node locations in Maharashtra region are yet to be formally agreed / approved. **Hence, a decision to finalise the same in interaction with GoM, with the support of DMICDC & DIPP, would remain as the immediate way forward.**

Support Required from DIPP &DMICDC:

In order to facilitate finalisation of the Final Perspective Plan, the following components need to be addressed:

Finalisation of priority nodes in Maharashtra region of BMEC is vital to finalise the FINAL report of BMEC Perpective Plan. Although a recommendation on the same was submitted on 1st September 2015, the same is yet to be finalised by GoM. However to avoid delya consulatnts have prepared the final report based on the above-mentioned recommendation report, which was also prepared as per inputs provided by MIDC & DoI,GoM. In this regard, joint meeting between DMICDC, DIPP & GoM shall be organised to finalise the node locations of Mahrashtra and if the priority node assumed in this report is acceptable this report shall be considered as the final report, which will facilitate conclusion of the project phase.

Other component of the Project is finalisation of Site Specific Plan. The Site Specific Plan for Greenfield Industrial Node at Dharwad, was prepared & submitted on 4th November 2015, after

acceptance of landuse zoning plan by KSIIDC on 9th October 205. This plan needs to be reviewed by KSIIDC, Govt. of Karnataka and DMICDC,GoI.

Based on the finalisation of site boundary, acceptance & inputs provided for Site Specific Plan by Govt. of Karnataka & DMICDC, a report on site specific Plan will be prepared and submitted by the project consultants, which would be part of the 4th and final deliverable of the project. The following table illustrates the status and wayfoward of the project deliverables.

SN	Project Deliverables	Activity Duration (in Months)	Status & Timelines*
1	Inception Report	D*+0.5	**Completed (8th April)**
2	Submission of Draft Report on 'Perspective Plan for overall BMEC region'	D*+4.5	**Completed- Draft Report of Perspective Plan Submitted on 29th November 2014**. *(submitted based on inputs received on Draft Report of Perspective Plan (Interim) Submitted on 29th September.)*
3	**Broad Concept Plan (Site Specific Plan)** for a Greenfield Industrial Node/ Mega City	D*+7	**Submitted on 4th November 2015.** *Initially a Concept Plan/ Landuse Zoning Plan was submitted on 26th September 2015 & the same was submitted formally on 19th October 2015 after review, confirmation on site location and acceptance of the same by KSIIDC on 9th October*
4	Submission of Final Report on Perspective Plan for overall BMEC Region and Concept (Site Specific Plan) Report for Greenfield Mega City	D*+8	**Final Report Submitted on 17th November 2015.** *Earlier an interim Final Report on Perspective Plan for Overall BMEC Region was submitted on 26th June 2015.* *The Report on Site Specific Plan would be submitted within one from date of acceptance of site specific plan*

D - Start date is 15 days from the date of award of the project*

* *Timelines subject to approval / acceptance of previous activities/deliverables & timely availability of data*